

## BE-4

## Body Electrical System

### General Information

#### General Troubleshooting Information Before Troubleshooting

1. Check applicable fuses in the appropriate fuse/relay box.
2. Check the battery for damage, state of charge, and clean and tight connections.

(Refer to the EE group - "Battery")

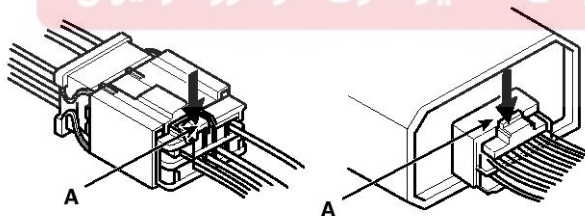
#### NOTICE

- Do not quick-charge a battery unless the battery ground cable has been disconnected, otherwise you will damage the alternator diodes.
- Do not attempt to crank the engine with the battery ground cable loosely connected or you will severely damage the wiring.

3. Check the alternator belt tension.

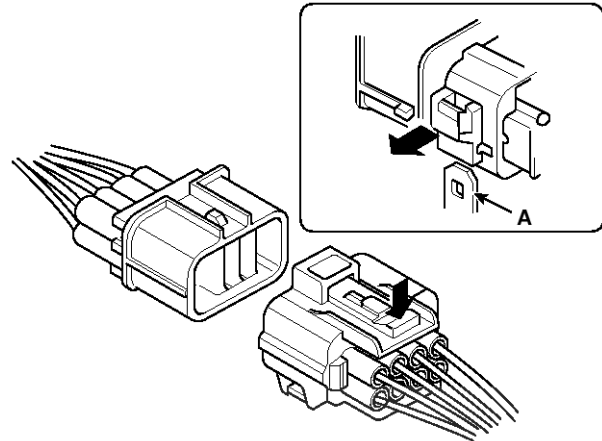
#### Handling Connectors

1. Make sure the connectors are clean and have no loose wire terminals.
2. Make sure multiple cavity connectors are packed with grease (except watertight connectors).
3. All connectors have push-down release type locks (A).



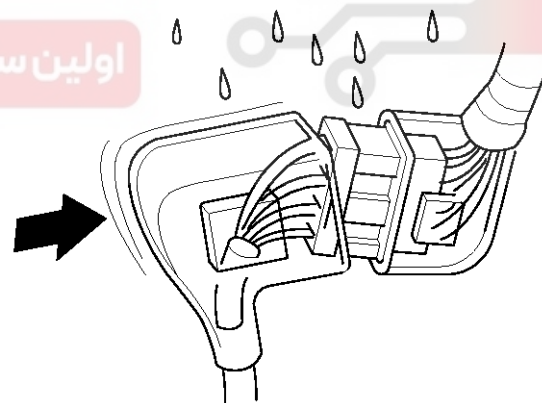
ETKD150A

4. Some connectors have a clip on their side used to attach them to a mount bracket on the body or on another component. This clip has a pull type lock.
5. Some mounted connectors cannot be disconnected unless you first release the lock and remove the connector from its mount bracket (A).



ETKD150B

6. Never try to disconnect connectors by pulling on their wires; pull on the connector halves instead.
7. Always reinstall plastic covers.

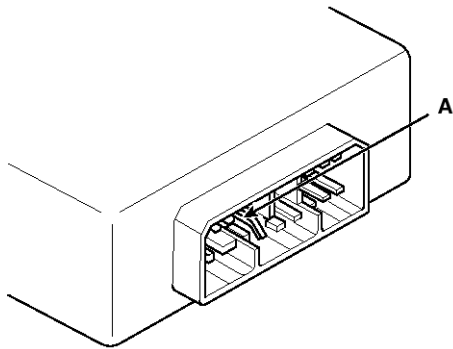


ETKD150C

# General Information

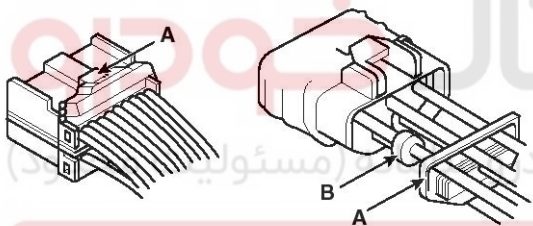
# BE-5

8. Before connecting connectors, make sure the terminals (A) are in place and not bent.



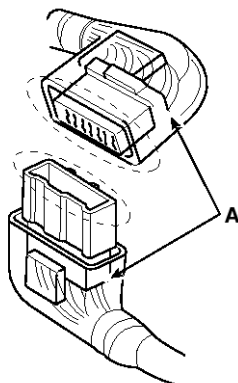
ETKD150D

9. Check for loose retainer (A) and rubber seals (B).



ETKD150E

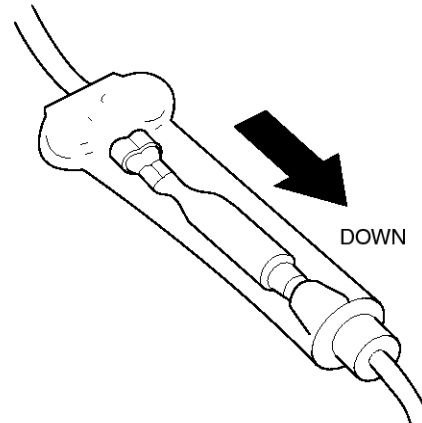
10. The backs of some connectors are packed with grease. Add grease if necessary. If the grease (A) is contaminated, replace it.



ETKD150F

11. Insert the connector all the way and make sure it is securely locked.

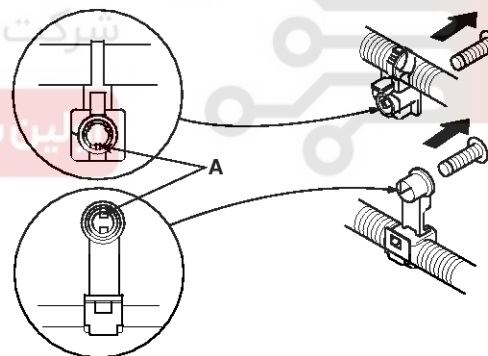
12. Position wires so that the open end of the cover faces down.



ETKD150G

## Handling Wires And Harnesses

1. Secure wires and wire harnesses to the frame with their respective wire ties at the designated locations.
2. Remove clips carefully; don't damage their locks (A).



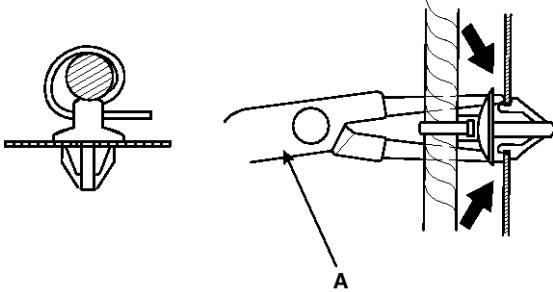
ETKD150H



## BE-6

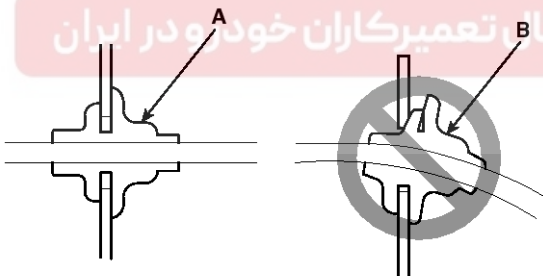
## Body Electrical System

- Slip pliers (A) under the clip base and through the hole at an angle, and then squeeze the expansion tabs to release the clip.



ETKD150I

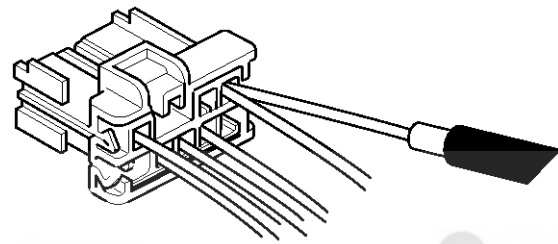
- After installing harness clips, make sure the harness doesn't interfere with any moving parts.
- Keep wire harnesses away from exhaust pipes and other hot parts, from sharp edges of brackets and holes, and from exposed screws and bolts.
- Seat grommets in their grooves properly (A). Do not leave grommets distorted (B).



ETKD150J

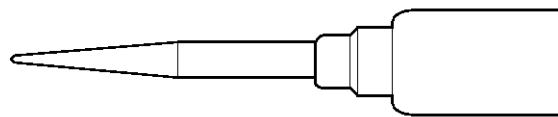
## Testing And Repairs

- Do not use wires or harnesses with broken insulation. Replace them or repair them by wrapping the break with electrical tape.
- After installing parts, make sure that no wires are pinched under them.
- When using electrical test equipment, follow the manufacturer's instructions and those described in this manual.
- If possible, insert the remover tool from the wire side (except waterproof connector).



ETKD150K

- Use a remover tool with a tapered tip.



ETKD150L

Refer to the user's guide in the wiring repair kit II  
(Pub. No. : 0K000 003 A05)

# General Information

# BE-7

## Five-step Troubleshooting

### 1. Verify the complaint

Turn on all the components in the problem circuit to verify the customer complaint. Note the symptoms. Do not begin disassembly or testing until you have narrowed down the problem area.

### 2. Analyze the schematic

Look up the schematic for the problem circuit.

Determine how the circuit is supposed to work by tracing the current paths from the power feed through the circuit components to ground. If several circuits fail at the same time, the fuse or ground is a likely cause.

Based on the symptoms and your understanding of the circuit operation, identify one or more possible causes of the problem.

### 3. Isolate the problem by testing the circuit.

Make circuit tests to check the diagnosis you made in step 2. Keep in mind that a logical, simple procedure is the key to efficient troubleshooting.

Test for the most likely cause of failure first. Try to make tests at points that are easily accessible.

### 4. Fix the problem

Once the specific problem is identified, make the repair. Be sure to use proper tools and safe procedures.

### 5. Make sure the circuit works

Turn on all components in the repaired circuit in all modes to make sure you've fixed the entire problem. If the problem was a blown fuse, be sure to test all of the circuits on the fuse. Make sure no new problems turn up and the original problem does not recur.



**BE-8****Body Electrical System****Battery Reset****Description**

When reconnecting the battery cable after disconnecting, recharging battery after discharged or installing the memory fuse located on the driver's side panel after removing, be sure to reset systems mentioned on the below table.

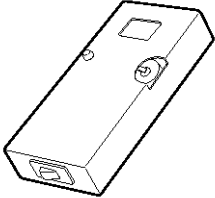
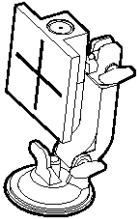
In addition, when replacing or reinstalling their fuses after removing, they should be reset according to the below table. Please refer to the below table when servicing.

| System                   | Resetting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power window             | Whenever the window cannot be properly closed or opened. Whenever the battery is discharged or the related fuse is replaced or reinstalled, reset the power window system according to the procedure below.<br>1. Turn the ignition switch to the ON position.<br>2. Push up the power window switch until the window glass is entirely down and then push up continuously for about 1 sec.                                                                                                                                                                                                                                                                                                                                                      |
| Panoramaroof             | Whenever the vehicle battery is disconnected or discharged, or related fuse is blown, you must reset your panoramaroof system as follows :<br>1. Turn the ignition switch to the ON position and close the panoramaroof glass and sunshade completely.<br>2. Release the control lever.<br>3. Push the panoramaroof control lever forward in the direction of close (about 10 seconds) until the panoramaroof moves a little. Then, release the lever.<br>4. Push the panoramaroof control lever forward in the direction of close until the sunroof operates as follows :<br>SUNSHADE OPEN → TILT OPEN → SLIDE OPEN → SLIDE CLOSE → SUNSHADE CLOSE<br>Then, release the control lever. When this is complete, the panoramaroof system is reset. |
| Trip computer            | When the battery is disconnected and reconnected, the set functions of the trip computer become initialized. So, you need to explain this information to the customer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Clock                    | Whenever the battery terminals or related fuses are disconnected, you must reset the time. (Refer to owner's manual)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Audio                    | When the battery is disconnected and reconnected, the customer's radio stations become initialized. So, you need to record the customer's radio stations prior to service, and after service, set the customer's radio stations into the audio.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Heater & Air Conditioner | When the battery is disconnected and reconnected, the heater and A/Con become initialized. So, heater and A/Con should be reset.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## General Information

## BE-9

### Special Service Tools

| Tool (Number and Name)                  | Illustration                                                                                        | Application                                        |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------|
| RKE Battery Checker<br>(09954-2P100)    |  <p>SYFBE0291L</p> | Measuring the RKE battery voltage                  |
| Correction jig of LDWS<br>(09890-3N100) |  <p>SVIB19187D</p> | Correction of LDWS (Lane Departure Warning System) |

# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



## BE-10

## Body Electrical System

## Audio

## Specification

## Audio

| Item                               |    | Specification           |                                                   |
|------------------------------------|----|-------------------------|---------------------------------------------------|
| Model                              |    | RADIO/CD/MP3<br>(PA710) | RADIO/CDC/MP3<br>(PA760)                          |
| Power supply                       |    | DC 14.4V                |                                                   |
| Rated output                       |    | Max. 43W x 4            | Max. 3.2Vrms                                      |
| Impedance ( $\Omega$ )             |    | 4ohm x 4                |                                                   |
| Antenna                            |    | 80PF 75 $\Omega$        |                                                   |
| Tuning type                        |    | PLL synthesized type    |                                                   |
| Other                              |    | Internal amplifier      | External amplifier, Center speaker,<br>Sub woofer |
| Frequency range<br>/ Channel space | FM | 87.5~108 MHz/ 100KHz    |                                                   |
|                                    | AM | 531~1602 KHz/ 9KHz      |                                                   |

## Speaker

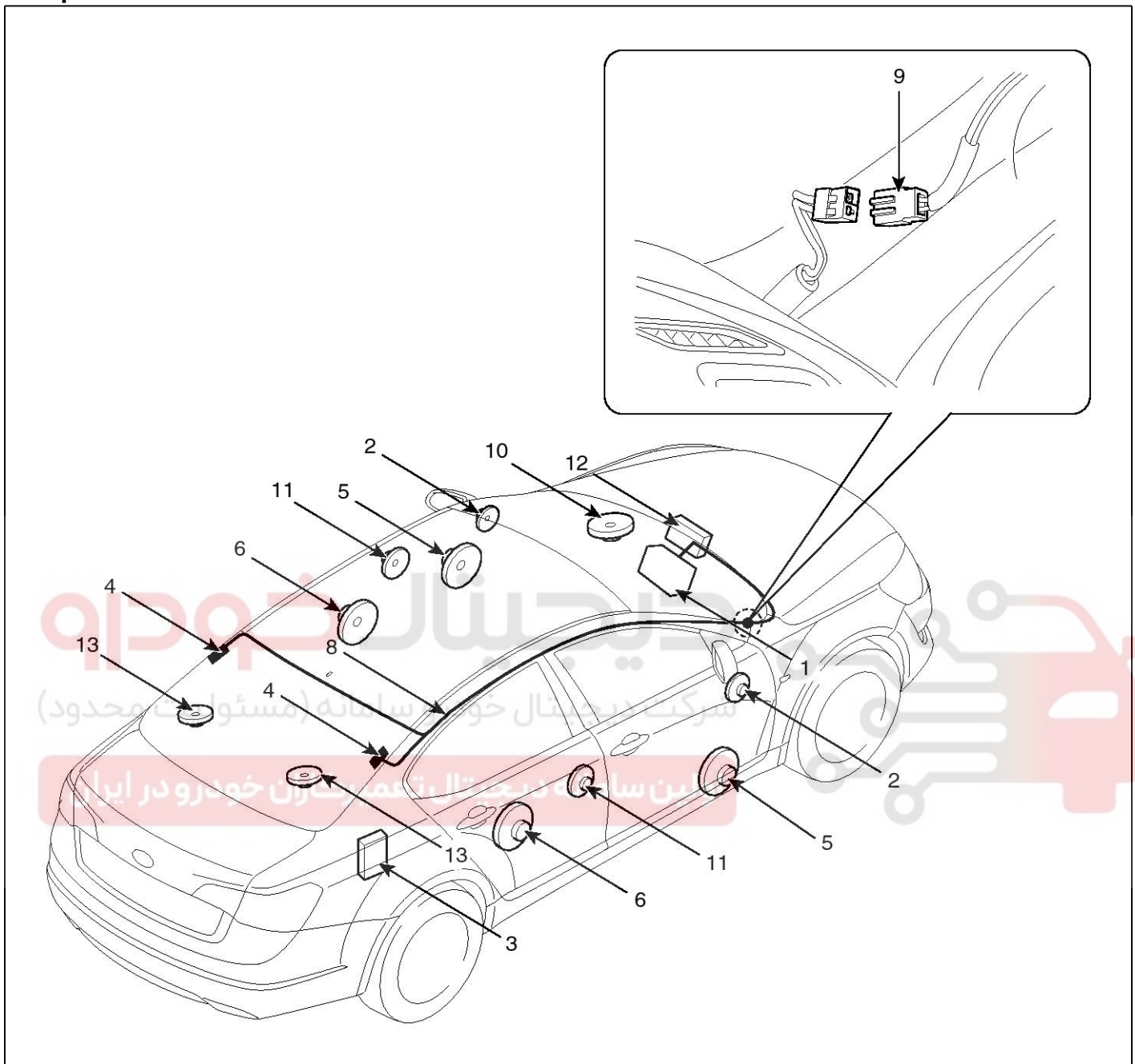
| Item                    |                  | PA710         | PA760         |
|-------------------------|------------------|---------------|---------------|
| Input power<br>(W or V) | Front            | MAX 40W       |               |
|                         | Rear             | MAX 40W       |               |
|                         | Front tweeter    | MAX 40W       |               |
|                         | Rear tweeter     | -             | MAX 40W       |
|                         | Sub woofer       | -             | MAX 40W       |
|                         | Center speaker   | -             | MAX 30W       |
|                         | Surround speaker | -             | MAX 30W       |
| Impedance ( $\Omega$ )  | Front            | 4 $\pm$ 0.6   |               |
|                         | Rear             | 2.0 $\pm$ 0.3 |               |
|                         | Front tweeter    | 3.4 $\pm$ 0.5 |               |
|                         | Rear tweeter     | -             | 3.4 $\pm$ 0.5 |
|                         | Sub woofer       | -             | 2 $\pm$ 0.3   |
|                         | Center speaker   | -             | 2 $\pm$ 0.3   |
|                         | Surround speaker | -             | 2 $\pm$ 0.3   |
| Number of speaker       |                  | 6             | 8 or 12       |



# Audio

# BE-11

## Component Location



SVGBE0001D

- |                                             |                                   |
|---------------------------------------------|-----------------------------------|
| 1. Audio unit                               | 8. Antenna feeder cable           |
| 2. Front tweeter speaker                    | 9. Feeder cable joint connector   |
| 3. External amplifier                       | 10. Center speaker (Option)       |
| 4. Glass antenna amplifier (Diversity type) | 11. Rear tweeter speaker (Option) |
| 5. Front door speaker                       | 12. Audio monitor                 |
| 6. Rear speaker                             | 13. Surround speaker (Option)     |
| 7. Woofer speaker (Option)                  |                                   |

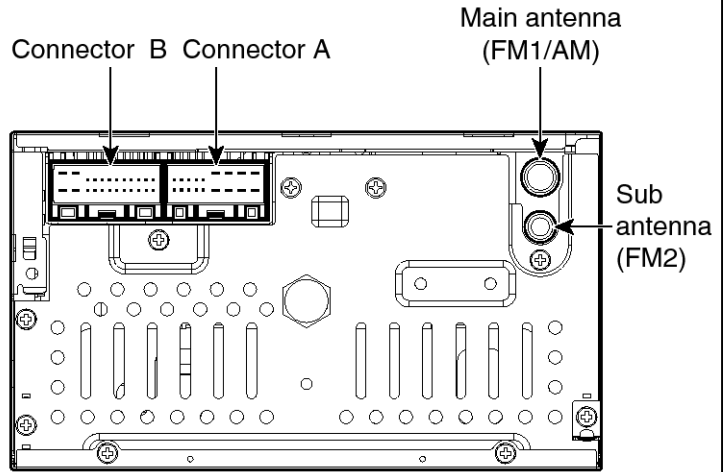
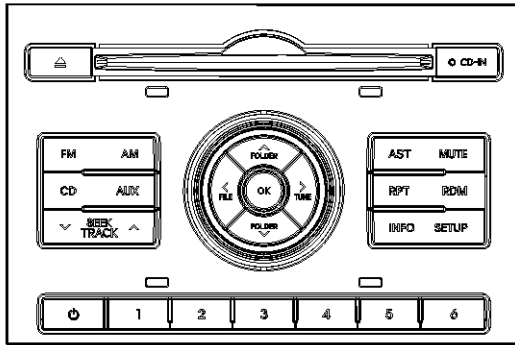
# BE-12

# Body Electrical System

## Audio Unit

### Components

[RADIO/CD/MP3 (PA710)]



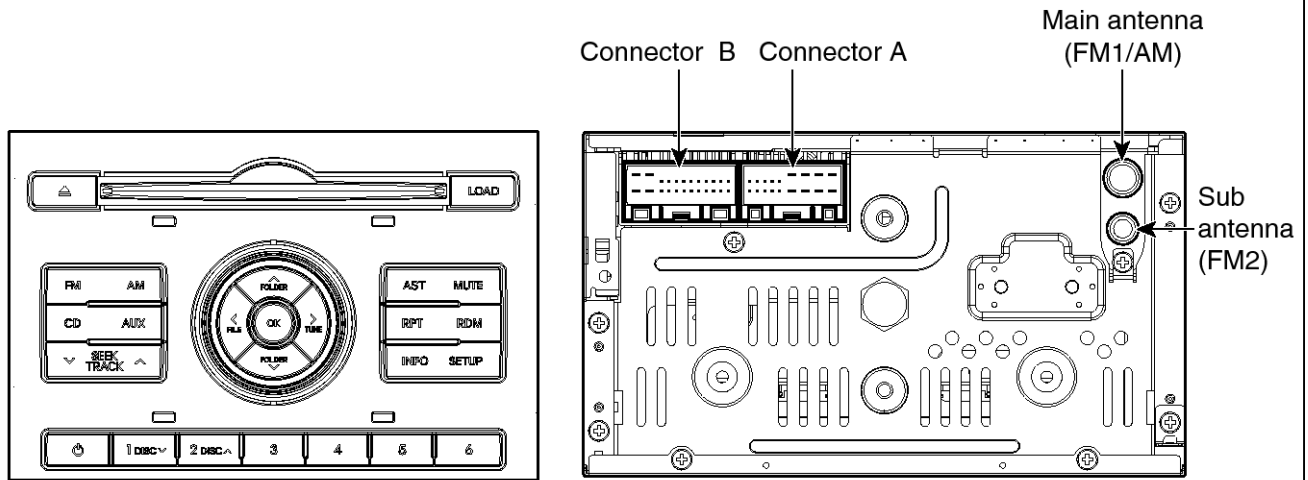
| Pin No | Connector A             | Connector B           |
|--------|-------------------------|-----------------------|
| 1      | Rear left speaker (+)   | CAN HI                |
| 2      | Front left speaker (+)  | -                     |
| 3      | Front right speaker (+) | -                     |
| 4      | Rear right speaker (+)  | Steering wheel remote |
| 5      | -                       | Rear remote           |
| 6      | -                       | USB D (+) / iPod RX   |
| 7      | -                       | USB/iPod 5V           |
| 8      | Illumination (+)        | AUX R IN              |
| 9      | Detent                  | AUX REF               |
| 10     | Rear left speaker (-)   | MIC+ (Bluetooth)      |
| 11     | Front left speaker (-)  | ACC                   |
| 12     | Front right speaker (-) | B+                    |
| 13     | Rear right speaker (-)  | CAN low               |
| 14     | -                       | -                     |
| 15     | -                       | -                     |
| 16     | Key                     | Speed                 |
| 17     | Illumination (-)        | Remote GND            |
| 18     | Remote antenna          | USB D (-) / iPod TX   |
| 19     |                         | USB/iPod GND          |
| 20     |                         | AUX DETECT            |
| 21     |                         | AUX L IN              |
| 22     |                         | MIC- (Bluetooth)      |
| 23     |                         | -                     |
| 24     |                         | Power GND             |

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Audio

BE-13

[RADIO/MP3/CDC (PA760)]



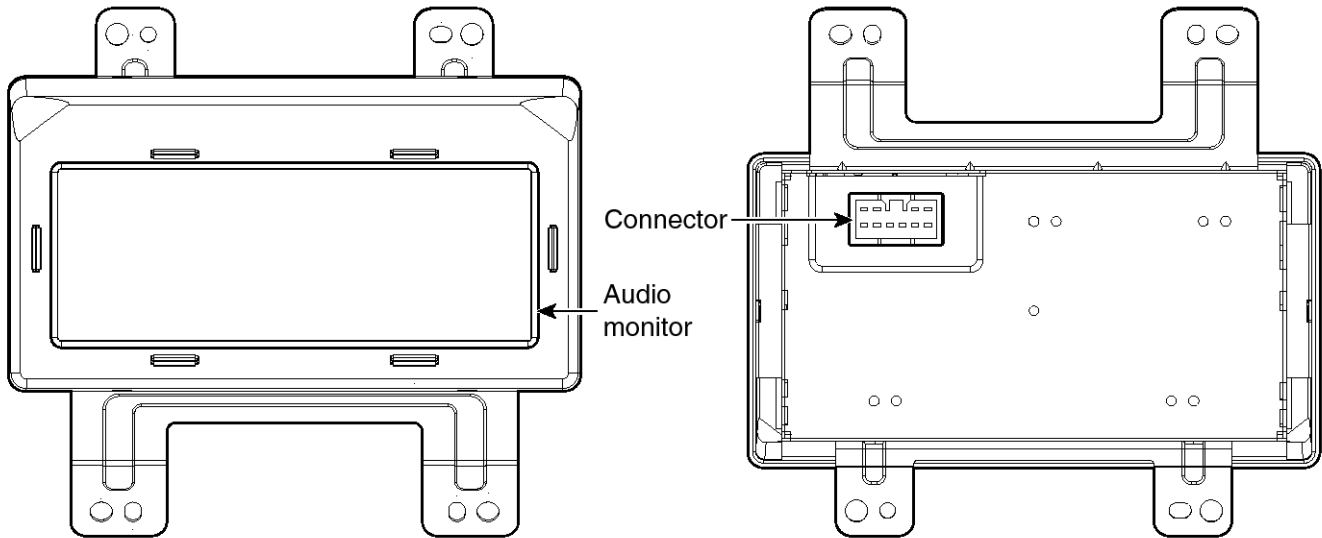
| Pin No | Connector A             | Connector B           |
|--------|-------------------------|-----------------------|
| 1      | -                       | CAN HI                |
| 2      | -                       | -                     |
| 3      | -                       | -                     |
| 4      | -                       | Steering wheel remote |
| 5      | SP DIF(Digital amp) GND | Rear mode             |
| 6      | SP DIF DN               | USB D (+) / iPod RX   |
| 7      | -                       | USB/iPod 5V           |
| 8      | Illumination (+)        | AUX R IN              |
| 9      | -                       | AUX REF               |
| 10     | -                       | MIC+ (Bluetooth)      |
| 11     | -                       | ACC                   |
| 12     | -                       | B+                    |
| 13     | -                       | CAN LOW               |
| 14     | -                       | -                     |
| 15     | SP DIF DP               | -                     |
| 16     | Key                     | Speed                 |
| 17     | Illumination (-)        | Remote GND            |
| 18     | Remote antenna          | USB D (-) / iPod TX   |
| 19     |                         | USB/iPod GND          |
| 20     |                         | AUX DETECT            |
| 21     |                         | AUX L IN              |
| 22     |                         | MIC- (Bluetooth)      |
| 23     |                         | -                     |
| 24     |                         | Power GND             |

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BE-14

Body Electrical System

[Audio Monitor]



Connector

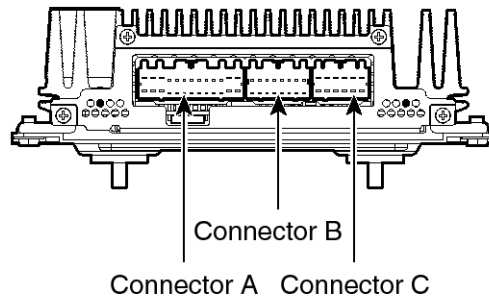
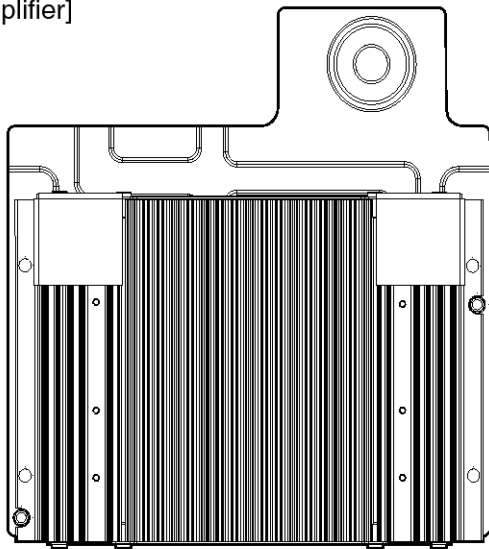
| No. | Name             |
|-----|------------------|
| 1   | Illumination (-) |
| 2   | DETENT out       |
| 3   | -                |
| 4   | Power ground     |
| 5   | -                |
| 6   | Illumination (+) |
| 7   | CAN low          |
| 8   | CAN high         |
| 9   | ACC              |
| 10  | Battery B+       |

SVGBE0034L

Audio

BE-15

[External Amplifier]



| No. | Connector A (26Pin) | Connector B (16Pin) | Connector C (12Pin)     |
|-----|---------------------|---------------------|-------------------------|
|     |                     |                     |                         |
| 1   | B (+)               | -                   | Rear door right (+)     |
| 2   | B (+)               | -                   | Rear door left (+)      |
| 3   | B (+)               | -                   | Front tweeter right (+) |
| 4   | -                   | -                   | Front tweeter left (+)  |
| 5   | CAN (+)             | -                   | Front door right (+)    |
| 6   | CAN (-)             | -                   | Front door left (+)     |
| 7   | ACC                 | Center speaker (+)  | Rear door right (-)     |
| 8   | -                   | -                   | Rear door left (-)      |
| 9   | -                   | -                   | Front tweeter right (-) |
| 10  | -                   | -                   | Front tweeter left (-)  |
| 11  | -                   | -                   | Front door right (-)    |
| 12  | Subwoofer 2 (+)     | -                   | Front door left (-)     |
| 13  | Subwoofer 1 (+)     | -                   |                         |
| 14  | GND                 | Center speaker (-)  |                         |
| 15  | GND                 | -                   |                         |
| 16  | GND                 | -                   |                         |
| 17  | -                   |                     |                         |
| 18  | SPDIF (+)           |                     |                         |
| 19  | SPDIF (-)           |                     |                         |
| 20  | -                   |                     |                         |
| 21  | -                   |                     |                         |
| 22  | -                   |                     |                         |
| 23  | -                   |                     |                         |
| 24  | -                   |                     |                         |
| 25  | Subwoofer 2 (-)     |                     |                         |
| 26  | Subwoofer 1 (-)     |                     |                         |

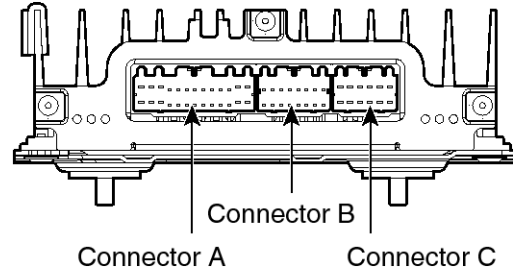
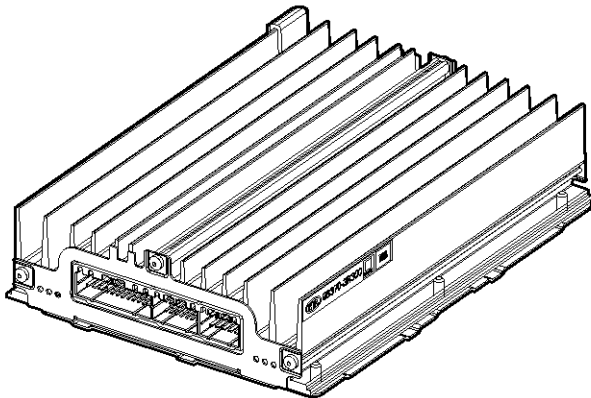
SVGBE0035L



BE-16

Body Electrical System

[External Amplifier (12 CH)]



| No. | Connector A (26Pin) | Connector B (16Pin) | Connector C (12Pin)     |
|-----|---------------------|---------------------|-------------------------|
|     |                     |                     |                         |
| 1   | B (+)               | Surround right (+)  | Rear door right (+)     |
| 2   | B (+)               | Surround left (+)   | Rear door left (+)      |
| 3   | B (+)               | -                   | Front tweeter right (+) |
| 4   | -                   | -                   | Front tweeter left (+)  |
| 5   | CAN (+)             | -                   | Front door right (+)    |
| 6   | CAN (-)             | -                   | Front door left (+)     |
| 7   | ACC                 | Center speaker (+)  | Rear door right (-)     |
| 8   | -                   | -                   | Rear door left (-)      |
| 9   | -                   | Surround right (-)  | Front tweeter right (-) |
| 10  | -                   | Surround left (-)   | Front tweeter left (-)  |
| 11  | -                   | -                   | Front door right (-)    |
| 12  | Subwoofer 2 (+)     | -                   | Front door left (-)     |
| 13  | Subwoofer 1 (+)     | -                   |                         |
| 14  | GND                 | Center speaker (-)  |                         |
| 15  | GND                 | -                   |                         |
| 16  | GND                 | -                   |                         |
| 17  | -                   |                     |                         |
| 18  | SPDIF (+)           |                     |                         |
| 19  | SPDIF (-)           |                     |                         |
| 20  | -                   |                     |                         |
| 21  | -                   |                     |                         |
| 22  | -                   |                     |                         |
| 23  | -                   |                     |                         |
| 24  | -                   |                     |                         |
| 25  | Subwoofer 2 (-)     |                     |                         |
| 26  | Subwoofer 1 (-)     |                     |                         |

SVGBE0036L

# Audio

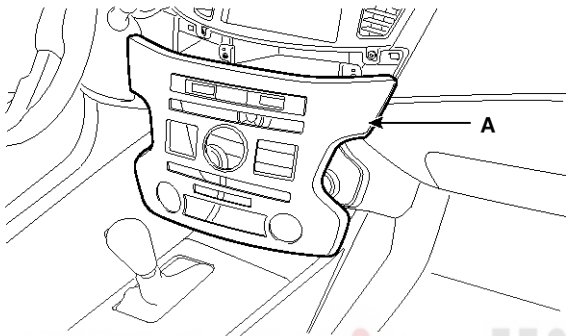
# BE-17

## Removal Audio Head Unit

### NOTICE

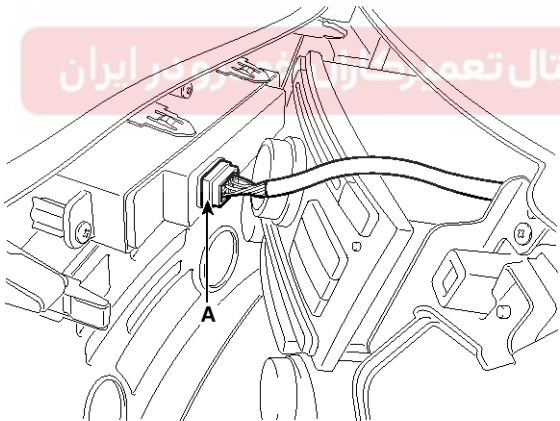
- Take care not to scratch the center fascia panel and related parts.
- Eject all the disc before removing the audio unit to prevent damaging the CD player's load mechanism.

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad center fascia panel (A).



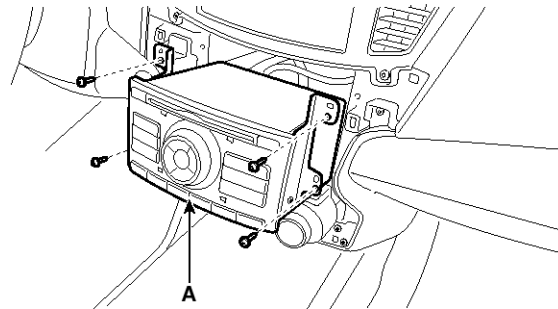
SVGBE0008D

3. Disconnect the center fascia panel connector (A).



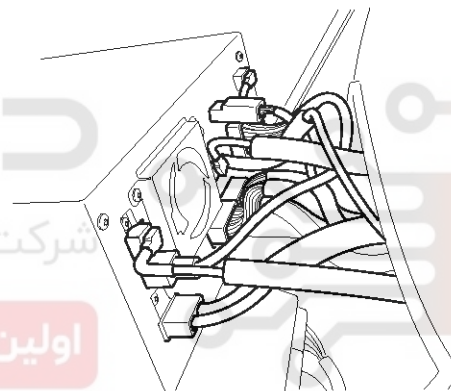
SVGBE0009D

4. Remove the audio head unit (A) after loosening the mounting screws.



SVGBE0010D

5. Remove the audio head unit connectors and cables.



SVGBE0011D

### NOTICE

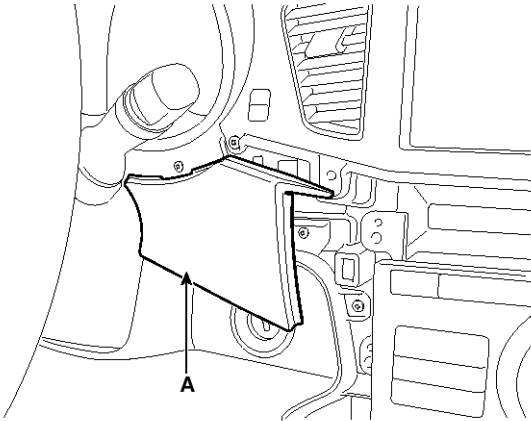
- If CD does not eject, don't try to remove it.
- The player may be damaged.
- Therefore, contact a service shop for repairs.

## BE-18

## Body Electrical System

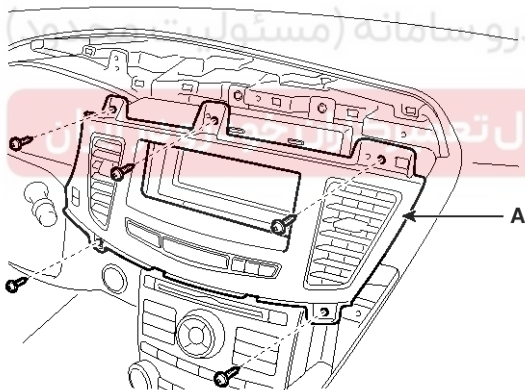
### Monitor

1. Remove the crash pad center fascia panel.  
(Refer to the BE group - "Audio System")
2. Remove the upper panel (A) on the button switch.



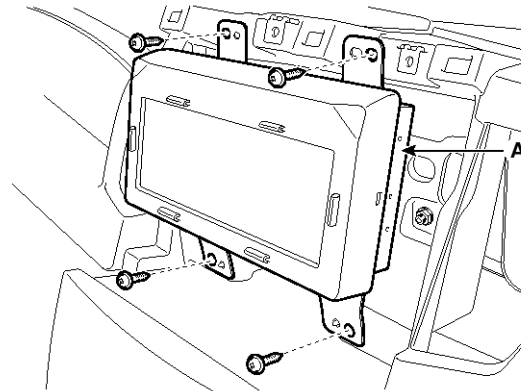
SVGBE0015D

3. Remove the cluster housing.  
(Refer to the BD group - "Crash pad")
4. Remove the air vent (A) after loosening the mounting screws.



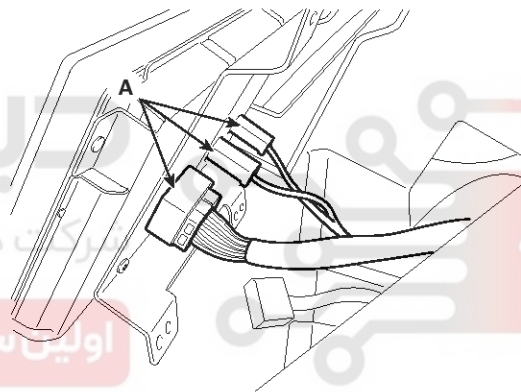
SVGBE0016D

5. Remove the monitor (A) after loosening the mounting screws.



SVGBE0017D

6. Disconnect the monitor connectors.



SVGBE0018D

# Audio

# BE-19

## Installation

### Audio Head Unit

1. Connect the audio unit connectors and cables.
2. Install the audio unit.
3. Install the crash pad center fascia panel.
4. Connect the negative (-) battery terminal.

#### **NOTICE**

Make sure the audio head unit connectors are plugged in properly and the antenna cable is connected properly.

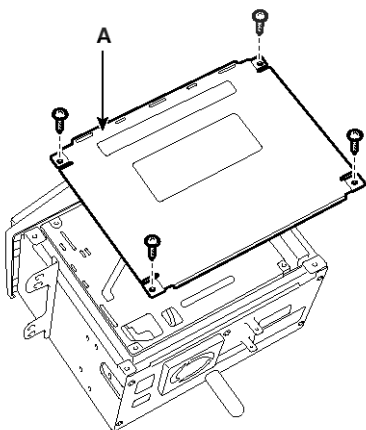
### Monitor

1. Install the monitor.
2. Install the air vent.
3. Install the cluster housing.
4. Install the upper panel.
5. Install the crash pad center fascia panel.

### Disassembly

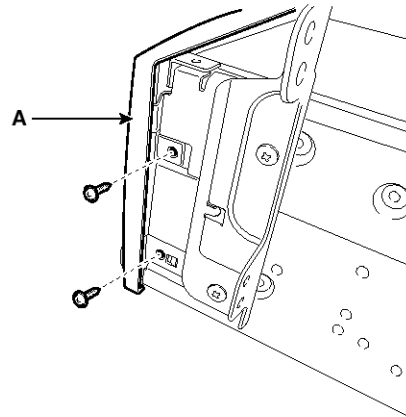
#### **NOTICE**

- Do not work in a dusty or dirty place.
  - Do not touch the circuit board with your bare hands.
  - Do not touch the terminal connector of the flat plate cable with your bare hands. (If you have touched it, wipe it off thoroughly)
  - If necessary of disassembling CD-rom drive, refer to the following procedures.
1. Remove the top cover (A) from the audio head unit after loosening the mounting screws (4EA).



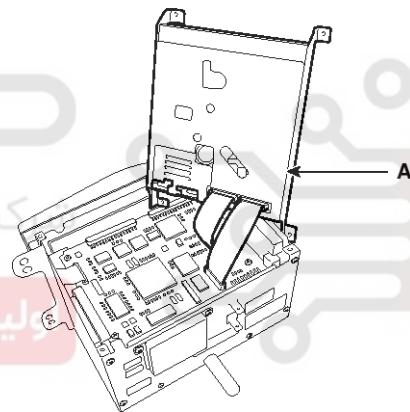
SVGBE0012D

2. Remove the front cover (A) after loosening the screws.



SVGBE0013D

3. Disconnect the film connector (A) between the unit and the drive.



SVGBE0014D

#### **NOTICE**

- Take care not to damage the film connector.

### Reassembly

1. Reconnect the film connector between the drive and audio head unit.
2. Reassemble the front cover.
3. Reassemble the top cover.

#### **NOTICE**

Make sure the film connector and cable jack are plugged in properly.

# BE-20

# Body Electrical System

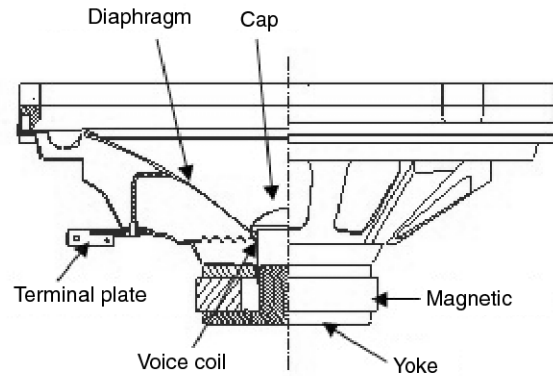
## Speakers

### Inspection

#### 1. Troubleshooting for Speaker

##### 1) Basic inspection of speaker

Inspect the sound from speaker after verifying that the speaker mounting screws are removed and the wiring connector is connected to remove any possible vibration transmitted from body trims and surrounding parts.



SNFBE8015N

#### 2) Case Troubleshooting

| No. | Case            | Inspection/Remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Trembling sound | <ol style="list-style-type: none"> <li>1. Before replacing the speaker, inspect that the mounting screw is installed normally.</li> <li>2. After re-installing the speaker, verify that no trembling sound is heard.</li> <li>3. When hearing a trembling sound again, replace the speaker with new one.</li> </ol>                                                                                                                                                                                                                                                                                                 |
| 2   | Noise           | <ol style="list-style-type: none"> <li>1. Check if the wiring connector is connected normally. If not, reconnect the wiring connector.</li> <li>2. In case of radio static, check if there is a noise from CD.</li> <li>3. When a noise is heard on turning radio and CD on, replace the speaker with new one.</li> </ol> <p><b>NOTICE</b><br/> <i>In case there is only radio static, this causes from poor radio reception. Thus the speaker needs no repair and replacement.</i></p>                                                                                                                             |
| 3   | Poor working    | <p>Inspection of the wiring connection between the battery and the speaker</p> <ol style="list-style-type: none"> <li>1. Before replacing the speaker, inspect the wiring connection between the battery and the speaker is normal.</li> <li>2. Check the supply power to the speaker and the resistance, then inspect the sound quality.                     <ul style="list-style-type: none"> <li>■ Specified impedance : 2 ~ 4Ω</li> </ul> </li> </ol> <p style="text-align: center;">SEDBE7028L</p> <ol style="list-style-type: none"> <li>3. If the speaker works poorly, replace it with new one.</li> </ol> |



# Audio

# BE-21

## ⚠ CAUTION

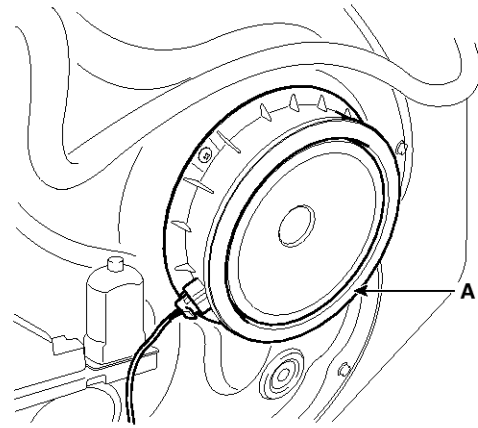
When handling the speakers:

- Do not damage the speaker with impact, like dropping or throwing it.
- Be careful not to drop water and oil on the speakers.
- Caution during handling of speaker because the material of diaphragm is paper which is easily torn by impact or external force.
- Modifying the audio system may cause damage the speakers. If this is the case, the speakers are not covered by the manufacturer's warranty.

## Removal

### Front Speaker

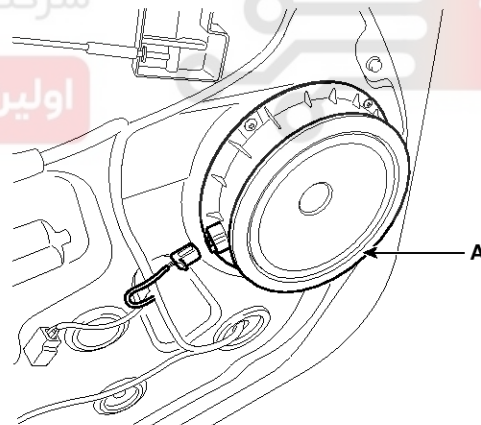
1. Remove the front door trim panel.  
(Refer to the BD group - "Front door")
2. Remove the front speaker (A) after loosening 4 bolts.



SVGBE0019D

### Rear Speaker

1. Remove the rear door trim panel.  
(Refer to the BD group - "Rear door")
2. Remove the rear speaker (A) after removing 4 bolts.



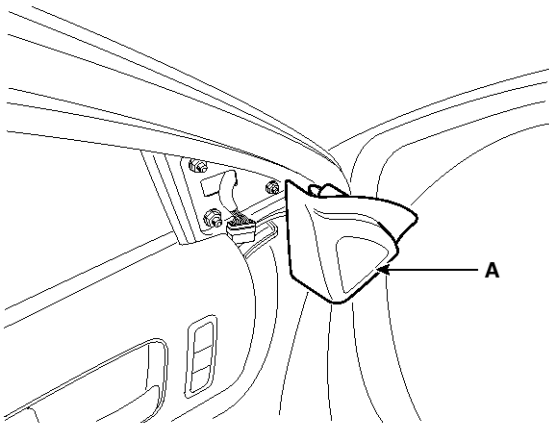
SVGBE0020D

# BE-22

# Body Electrical System

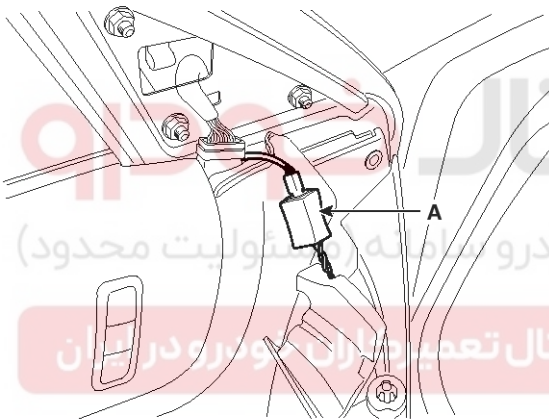
## Front Tweeter Speaker

1. Remove the door frame inner cover (A).



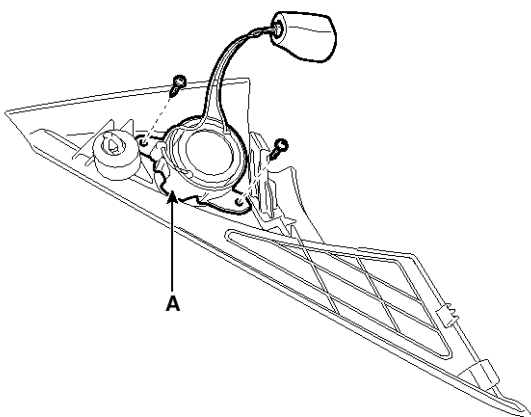
SVGBE0021D

2. Disconnect the front tweeter speaker connector (A).



SVGBE0022D

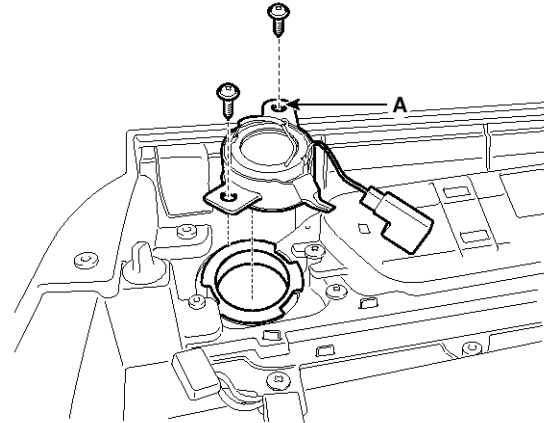
3. Remove the tweeter speaker (A) after loosening the screws (2EA).



SVGBE0023D

## Rear Tweeter Speaker

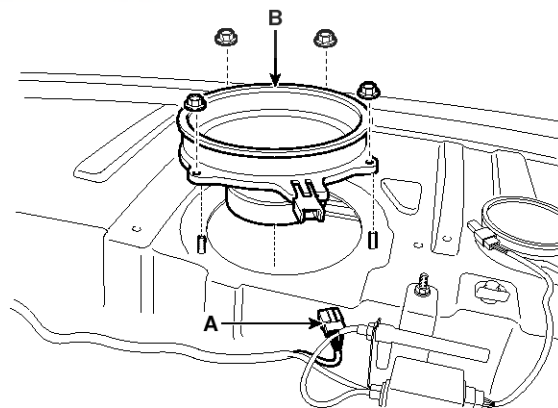
1. Remove the rear door trim.  
(Refer to the BE group - "Rear door")
2. Remove the rear tweeter speaker (A) after loosening the screws (2EA).



SVGBE0024D

## Sub Woofer Speaker

1. Remove the rear seat.  
(Refer to the BD group - "Rear seat")
2. Remove the rear package tray.  
(Refer to the BD group - "Package tray")
3. Disconnect the subwoofer speaker connector (A).
4. Remove the subwoofer speaker (B) after removing 4 nuts.



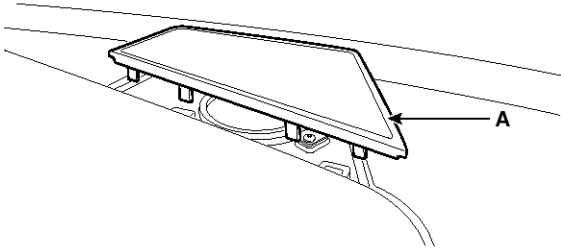
SVGBE0025D

## Audio

## BE-23

### Center Speaker

1. Remove the center speaker grill (A).



SVGBE0026D

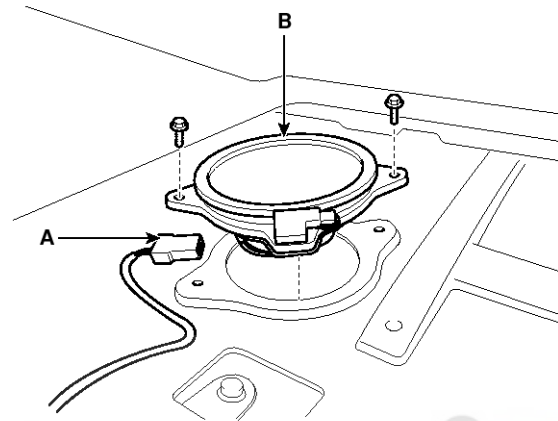
2. Remove the center speaker (A) after loosening the screws (2EA).



SVGBE0027D

### Rear Surround Speaker

1. Remove the rear seat.  
(Refer to the BD group - "Rear seat")
2. Remove the rear package tray.  
(Refer to the BD group - "Package tray")
3. Disconnect the rear surround speaker connector (A).
4. Remove the rear surround speaker (B) after removing 2 bolts.



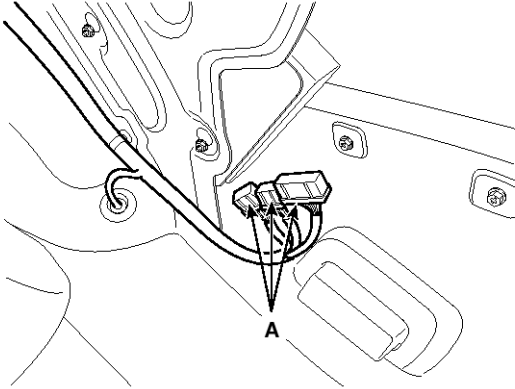
SVGBE0062D

## BE-24

## Body Electrical System

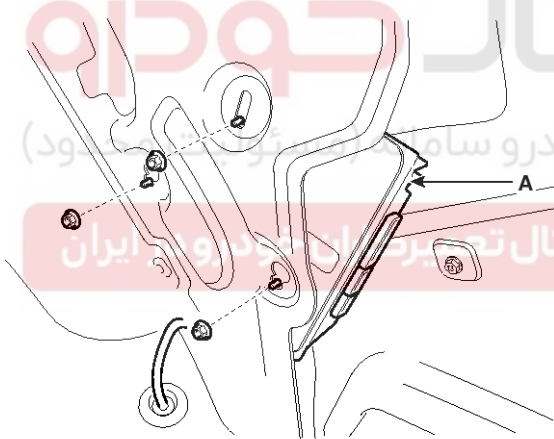
### External Amplifier

1. Remove the trunk right luggage side trim.  
(Refer to the BD group - "Interior trim")
2. Remove the external amplifier connectors (A).



SVGBE0028D

3. Remove the external amplifier (A) after loosening the mounting nuts (3EA).



SVGBE0029D

### Installation

#### Front Speaker

1. Install the front speaker.
2. Install the front door trim.

#### Rear Speaker

1. Install the rear speaker.
2. Install the rear door trim.

#### Front Tweeter Speaker

1. Install front the tweeter speaker.
2. Install front the tweeter speaker connector.
3. Install the door frame inner cover.

#### Rear Tweeter Speaker

1. Install the rear tweeter speaker.
2. Install the rear door trim.

#### Subwoofer Speaker

1. Install the subwoofer speaker after connecting the connector.
2. Install the rear package tray and rear seat assembly.

#### Center Speaker

1. Connecting the center speaker connector.
2. Install the center speaker.
3. Install the crash pad center speaker grill.

#### Rear Surround Speaker

1. Install the rear surround speaker.
2. Connecting the connector.
3. Install the rear package tray.
4. Install the rear seat.

#### External Amplifier

1. Install the external amplifier after connecting the connector.
2. Install the trunk right luggage side trim.

#### NOTICE

- Make sure the speaker and related connectors are plugged in properly.

# Audio

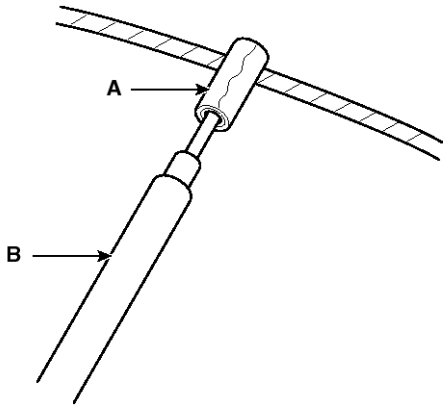
# BE-25

## Antenna

### Inspection

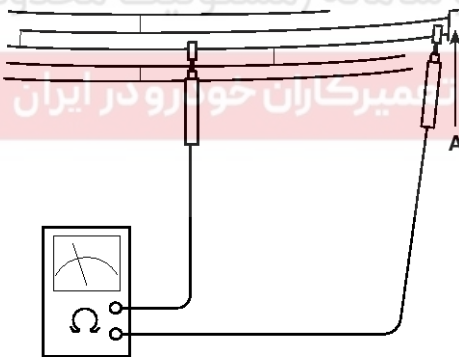
#### Glass Antenna Test

1. Wrap aluminum foil (A) around the tip of the tester probe (B) as shown.



ETRF023C

2. Touch one tester probe to the glass antenna terminal (A) and move the other tester probe along the antenna wires to check that continuity exists.



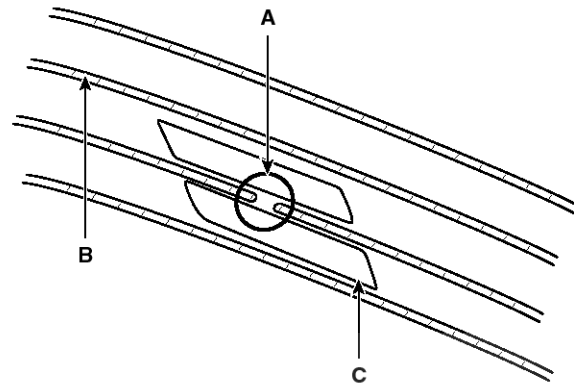
ETRF023D

### Glass Antenna Repair

#### NOTICE

To make an effective repair, the broken section must be no longer than one inch.

1. Lightly rub the area around the broken section (A) with fine steel wool, and then clean it with alcohol.

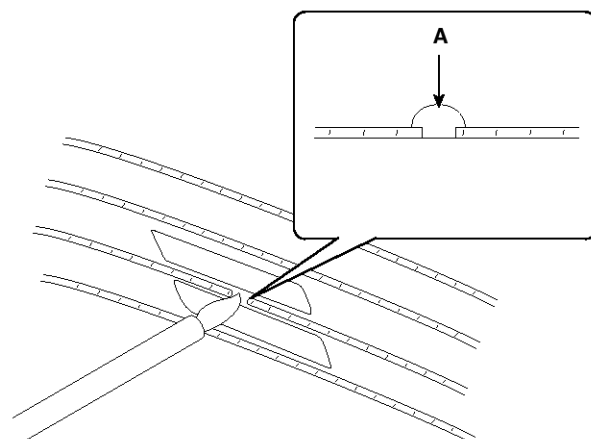


ETKD004K

2. Carefully mask above and below the broken portion of the glass antenna wire (B) with cellophane tape (C).
3. Using a small brush, apply a heavy coat of silver conductive paint (A) extending about 1/8" on both sides of the break. Allow 30 minutes to dry.

#### NOTICE

Thoroughly mix the paint before use.



KTKD006Z

4. Check for continuity in the repaired wire.
5. Apply a second coat of paint in the same way. Let it dry three hours before removing the tape.



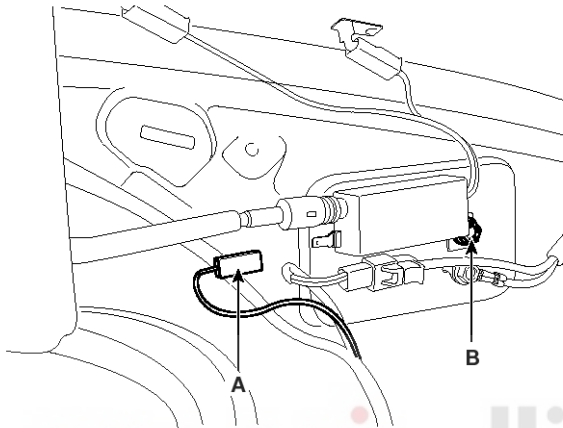
# BE-26

# Body Electrical System

## Glass Antenna Circuit Inspection

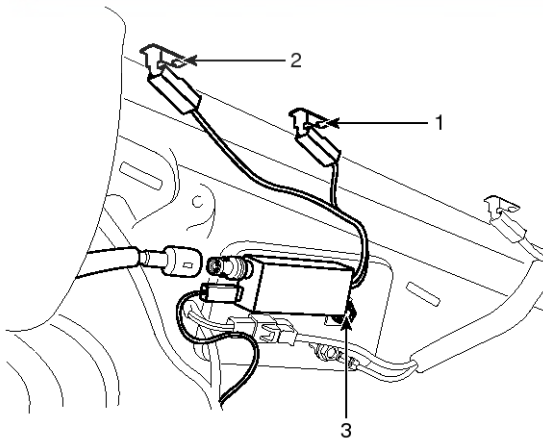
1. Remove the right side rear quarter trim.  
Then disconnect the antenna feeder cable from the glass antenna amp.
2. Turn the radio ON.  
Measure the voltage between terminal 2 of the harness side feeder cable (A) and body ground (B).

OK : approximately 12V (ACC+)



SVGBE0030D

3. Check for FM wire resistance between terminals of No.1 and 3
  1. FM antenna grid terminal
  2. AM antenna grid terminal
  3. Body ground.



SVGBE0031D

Standard value : 80~120KΩ (Average : 100 kΩ)

Short : Approx. 0Ω

Open : ∞ Ω

4. Check for AM wire resistance between terminals of No.2 and 3.

Standard value : 120~170KΩ (Average : 145 kΩ)

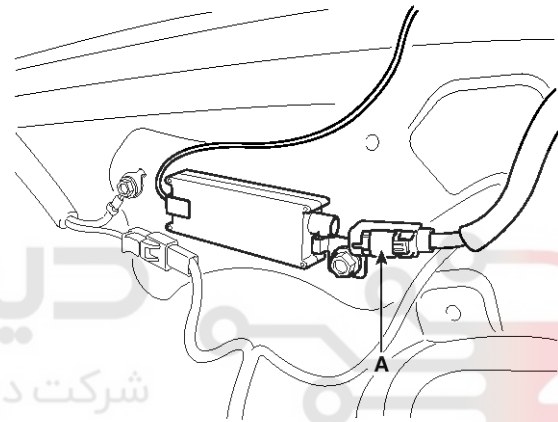
Short : Approx. 0Ω

Open : ∞ Ω

5. Check the grid lines for continuity.
6. When a poor radio reception is not repaired through the above inspection methods, replace the amp.  
If the radio reception is still poor, check the radio cable for short and radio head unit for failure.

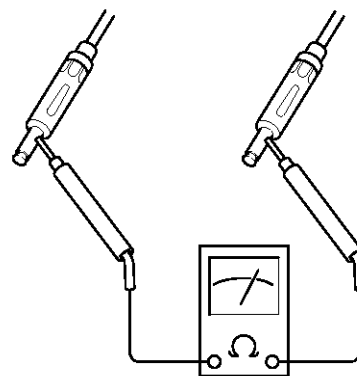
## Antenna Cable

1. Remove the antenna jack (A) from the audio unit and antenna.



SVGBE0032D

2. Check for continuity between the center poles of antenna cable.

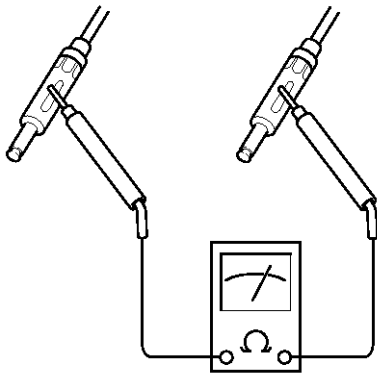


ATJF023C

## Audio

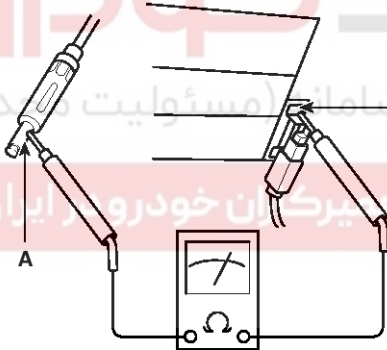
## BE-27

3. Check for continuity between the outer poles of antenna cable. There should be continuity.



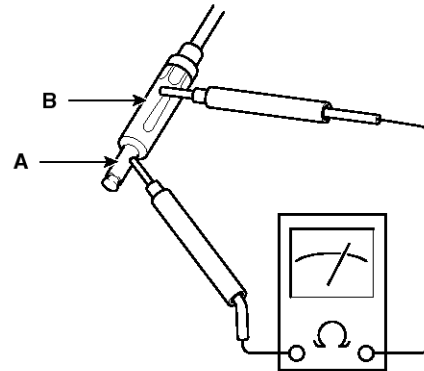
ATJF023D

4. If there is no continuity, replace the antenna cable.  
5. Check for continuity between the center pole (A) of antenna cable and terminal of glass antenna (B). There should be continuity.



ATJF023E

6. If there is no continuity, replace the antenna amplifier.  
7. Check for continuity between the center pole (A) and outer pole (B) of antenna cable. There should be no continuity.



ATJF023F

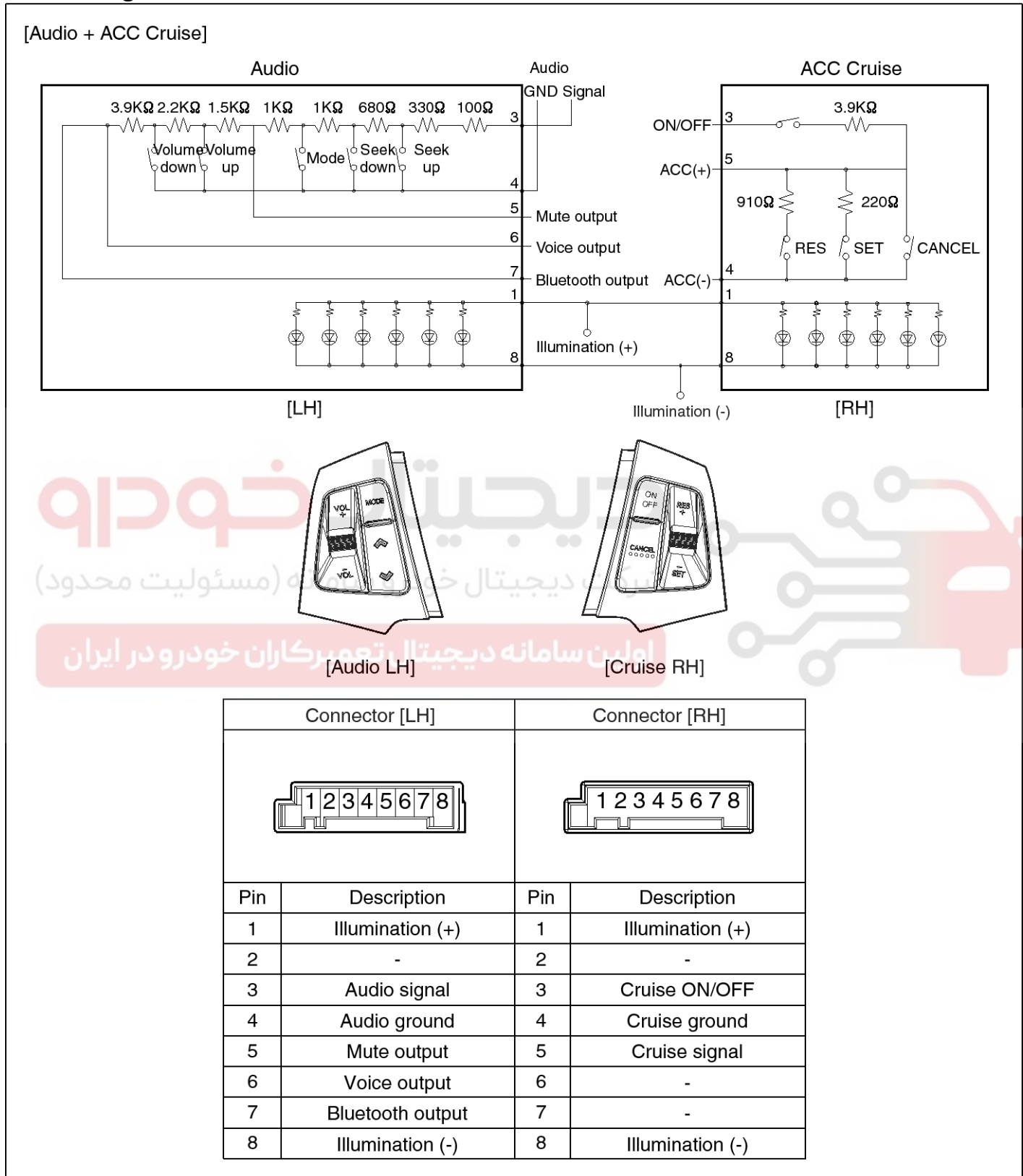
8. If there is continuity, replace the antenna cable.

# BE-28

# Body Electrical System

## Audio Remote Control

### Circuit Diagram

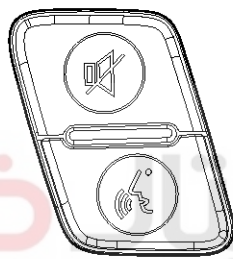
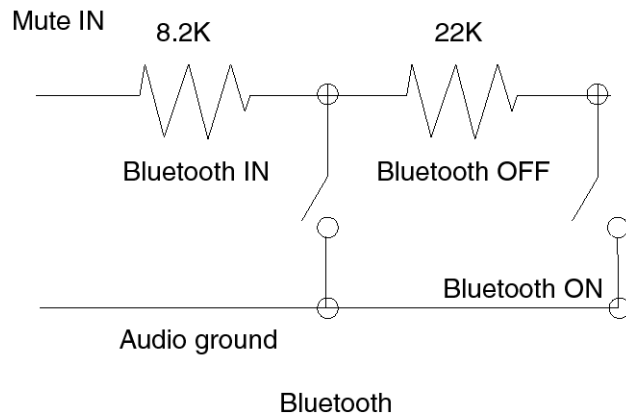
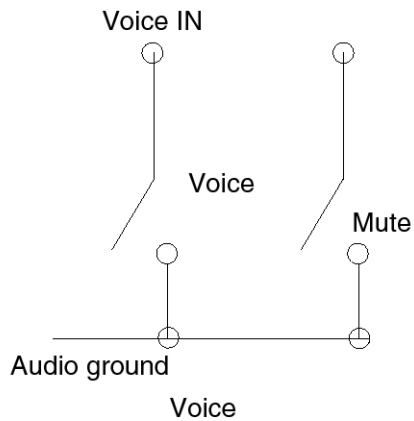


SVGBE0037L

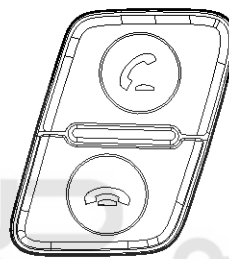
# Audio

# BE-29

[Voice + Bluetooth]



Voice (LH)



Bluetooth (RH)

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

این سامانه دیجیتال مخصوصاً برای خودرو در ایران

| Connector [LH] |                  | Connector [RH] |                  |
|----------------|------------------|----------------|------------------|
|                |                  |                |                  |
| Pin            | Description      | Pin            | Description      |
| 1              | Audio ground     | 1              | Illumination (-) |
| 2              | Illumination (+) | 2              | -                |
| 3              | Voice IN         | 3              | Audio ground     |
| 4              | Illumination (-) | 4              | Voice IN         |
| 5              | Mute IN          | 5              | Illumination (+) |
| 6              | -                | 6              | -                |

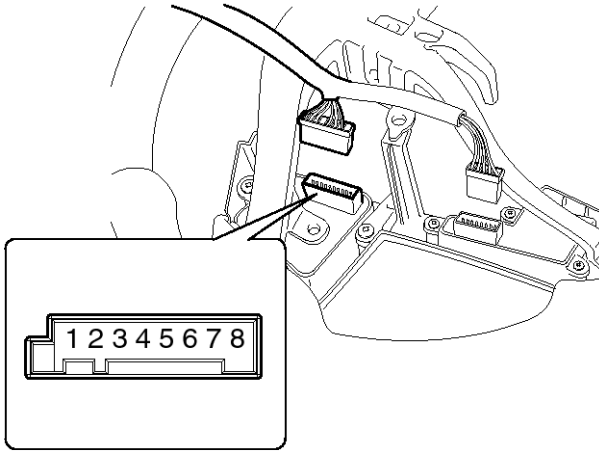
SVGBE0038L

# BE-30

# Body Electrical System

## Inspection

1. Check the audio remote control switch for resistance between No.3 and No.4 terminals in each switch position.



SVGB10070D

## [Audio]

| Switch      | Connector terminal | Resistance (±5%) |
|-------------|--------------------|------------------|
| Volume down | 3-4 (Audio side)   | 6.81 kΩ          |
| Volume up   | 3-4 (Audio side)   | 4.61 kΩ          |
| Mode        | 3-4 (Audio side)   | 2.11 kΩ          |
| Seek down   | 3-4 (Audio side)   | 1.11 kΩ          |
| Seek up     | 3-4 (Audio side)   | 430 Ω            |

## [Voice]

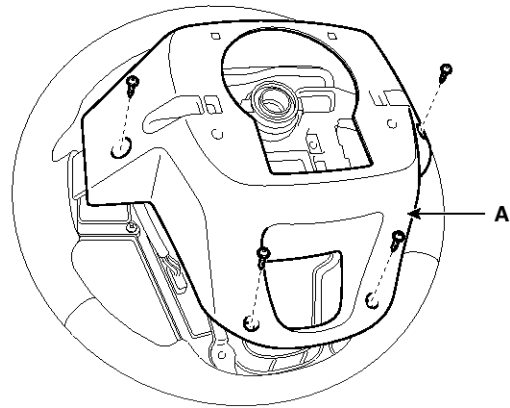
| Switch | Connector terminal | Resistance (±5%) |
|--------|--------------------|------------------|
| MUTE   | 3-4 (Audio side)   | 3.11 kΩ          |
| Voice  | 3-4 (Audio side)   | 10.71 kΩ         |
| END    | 3-4 (Audio side)   | 18.91 kΩ         |
| SEND   | 3-4 (Audio side)   | 40.91 kΩ         |

## [Bluetooth Hand Free]

| Switch | Connector terminal | Resistance (±5%) |
|--------|--------------------|------------------|
| END    | 3-4 (Audio side)   | 18.91 kΩ         |
| SEND   | 3-4 (Audio side)   | 40.91 kΩ         |

## Removal

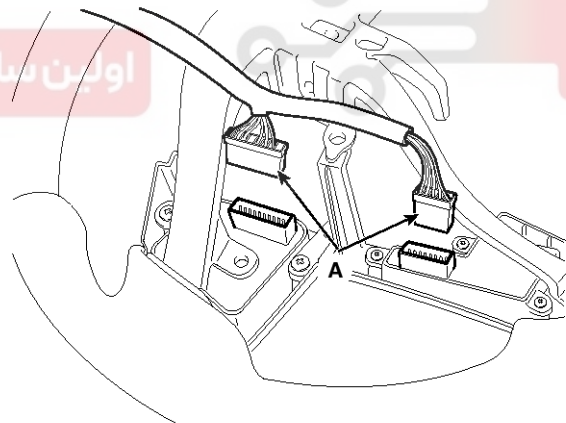
1. Remove the driver airbag module.  
(Refer to the RT group)
2. Remove the steering wheel.  
(Refer to the ST group - "Steering column & shaft")
3. Remove the steering wheel cover (A) after loosening the screws.



SVGB10071D

4. Remove the steering wheel remote control switch connector (A).

## [LH - Audio]

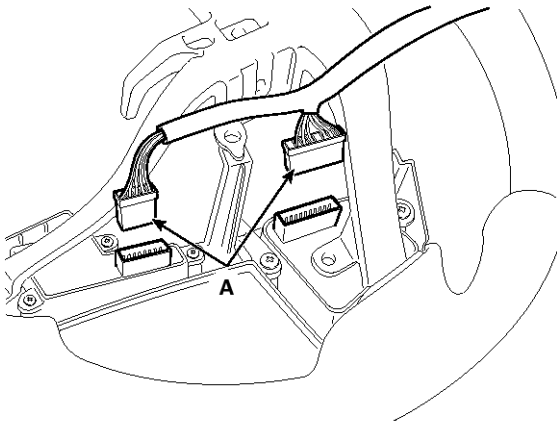


SVGB10072D

# Audio

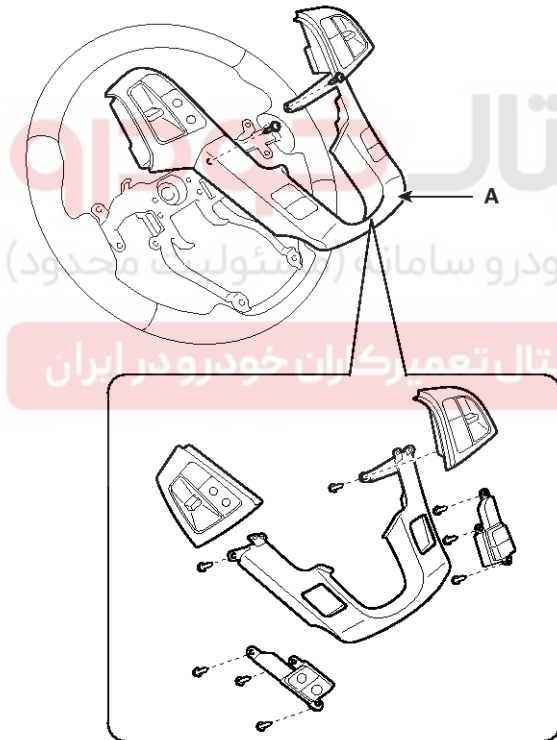
# BE-31

[RH - Bluetooth]



SVGB10073D

5. Remove the steering wheel remote control switch (A) after loosening the mounting screws.



SVGB10074D

## Installation

1. Reassemble the steering wheel remote control switch.
2. Reassemble the steering wheel cover.
3. Reassemble the steering wheel.
4. Reassemble the steering wheel remote control switch and airbag connector.

### NOTICE

*Make sure the audio remote control switch and the airbag module connectors are plugged in properly.*

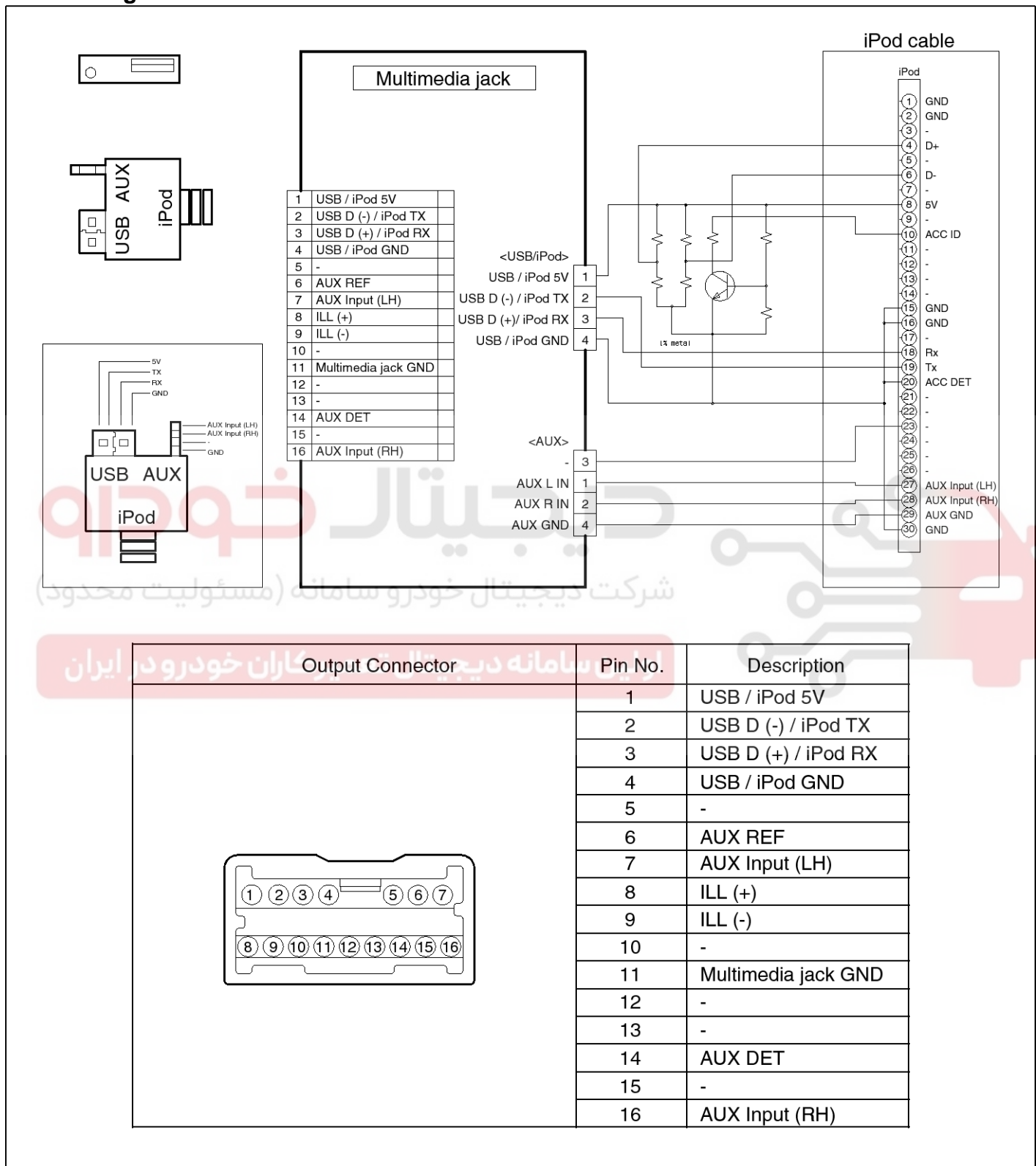
5. Reassemble the driver airbag module.

# BE-32

# Body Electrical System

## Multimedia jack

### Circuit Diagram



SVGBE0039L



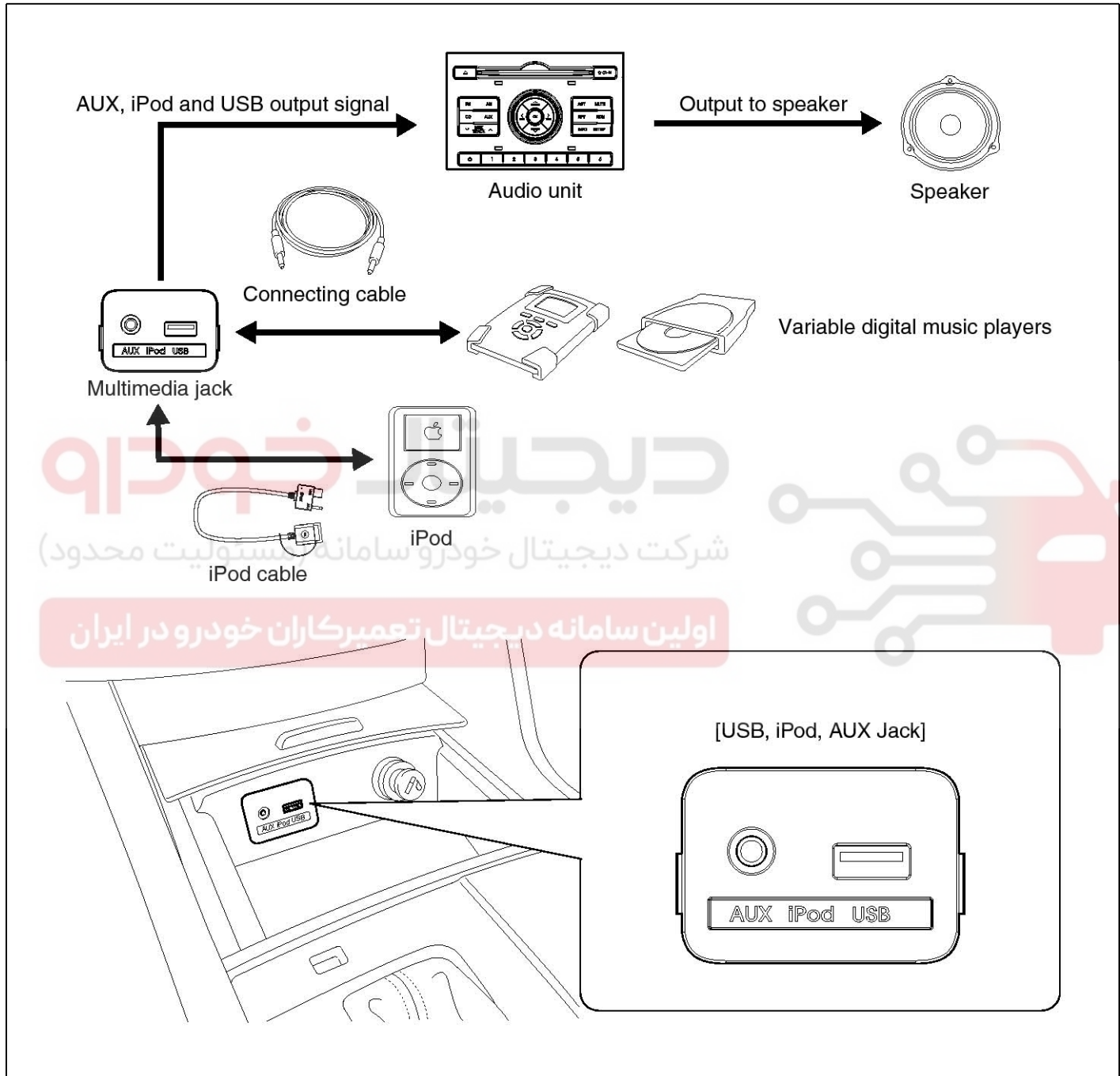
# Audio

# BE-33

## Description

The multimedia jack on the console upper cover is for customers who like to listen to external portable music players like the MP3, iPod and etc., through the vehicle's sound system when it is linked to this jack. The customer has this added option.

In case of distortions from media connected to the AUX source, the audio unit may not be defective but the output level of the used media does not match the specification of the AUX input.



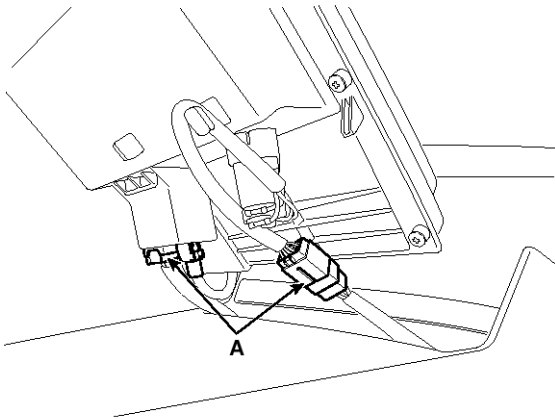
SVGBE0040L

## BE-34

## Body Electrical System

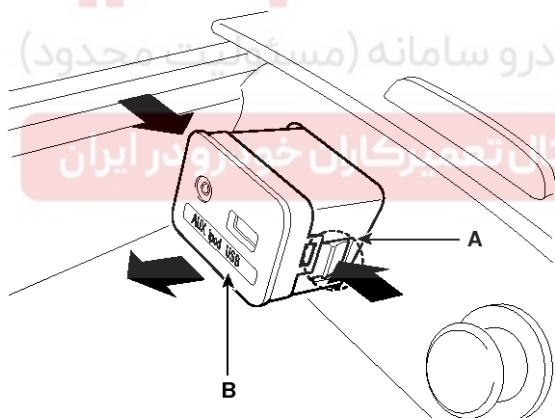
### Removal

1. Remove the shift lever knob.  
(Refer to the BD group - "Console")
2. Remove the floor console upper cover.
3. Disconnect the connector (A) from the floor console upper cover.



SVGBE0037D

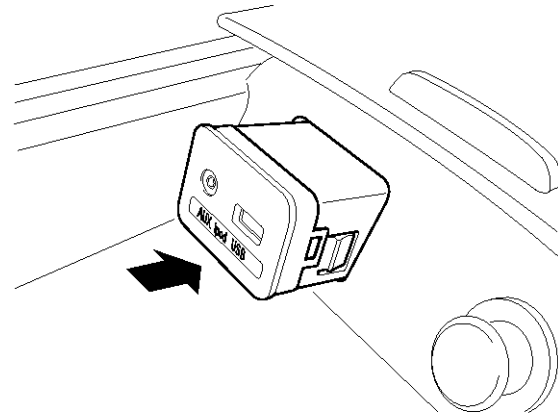
4. Remove the multimedia jack (B) from the console upper cover after releasing the fixed hooks (A).



SVGBE0038D

### Installation

1. Install the multimedia jack.



SVGB10080D

2. Install the floor console upper cover.
3. Install the shift lever knob.

### NOTICE

Make sure the multimedia connector and the console upper cover connectors are plugged in properly.

## Audio

## BE-35

## Troubleshooting

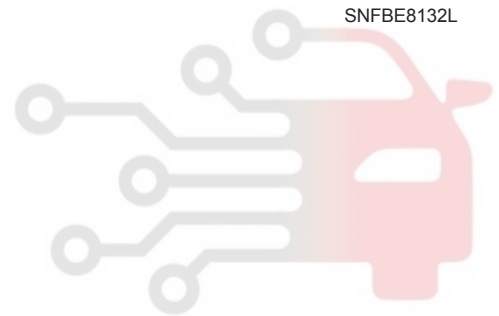
## Customer Complaint Analysis Check Sheet

|                                                                                                                                       |                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>TROUBLE IN</b>                                                                                                                     | <input type="checkbox"/> ALL <input type="checkbox"/> AM <input type="checkbox"/> FM <input type="checkbox"/> CD <input type="checkbox"/> MP3 <input type="checkbox"/> CD changer <input type="checkbox"/> AMP <input type="checkbox"/> Others                                                                  |
| <b>TROUBLE OCCURS</b>                                                                                                                 | <input type="checkbox"/> Always <input type="checkbox"/> Engine start <input type="checkbox"/> Engine Running <input type="checkbox"/> Cold <input type="checkbox"/> Warm <input type="checkbox"/> Sometimes<br><input type="checkbox"/> Most of the time <input type="checkbox"/> Engine off                   |
| <b>TYPE OF TROUBLE</b>                                                                                                                | <input type="checkbox"/> Will not play <input type="checkbox"/> Weak <input type="checkbox"/> Squealing noise <input type="checkbox"/> Display/illumination poor<br><input type="checkbox"/> CD skips & jumps <input type="checkbox"/> CD will not eject or insert <input type="checkbox"/> Others (Describe) : |
| <b>OTHERS</b>                                                                                                                         | ▶ Customer complaint contents :<br>▶ Have you checked customer's defects :                                                                                                                                                                                                                                      |
| * Using the customer complaint analysis check sheet for reference, ask the customer for as much detail as possible about the problem. |                                                                                                                                                                                                                                                                                                                 |

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

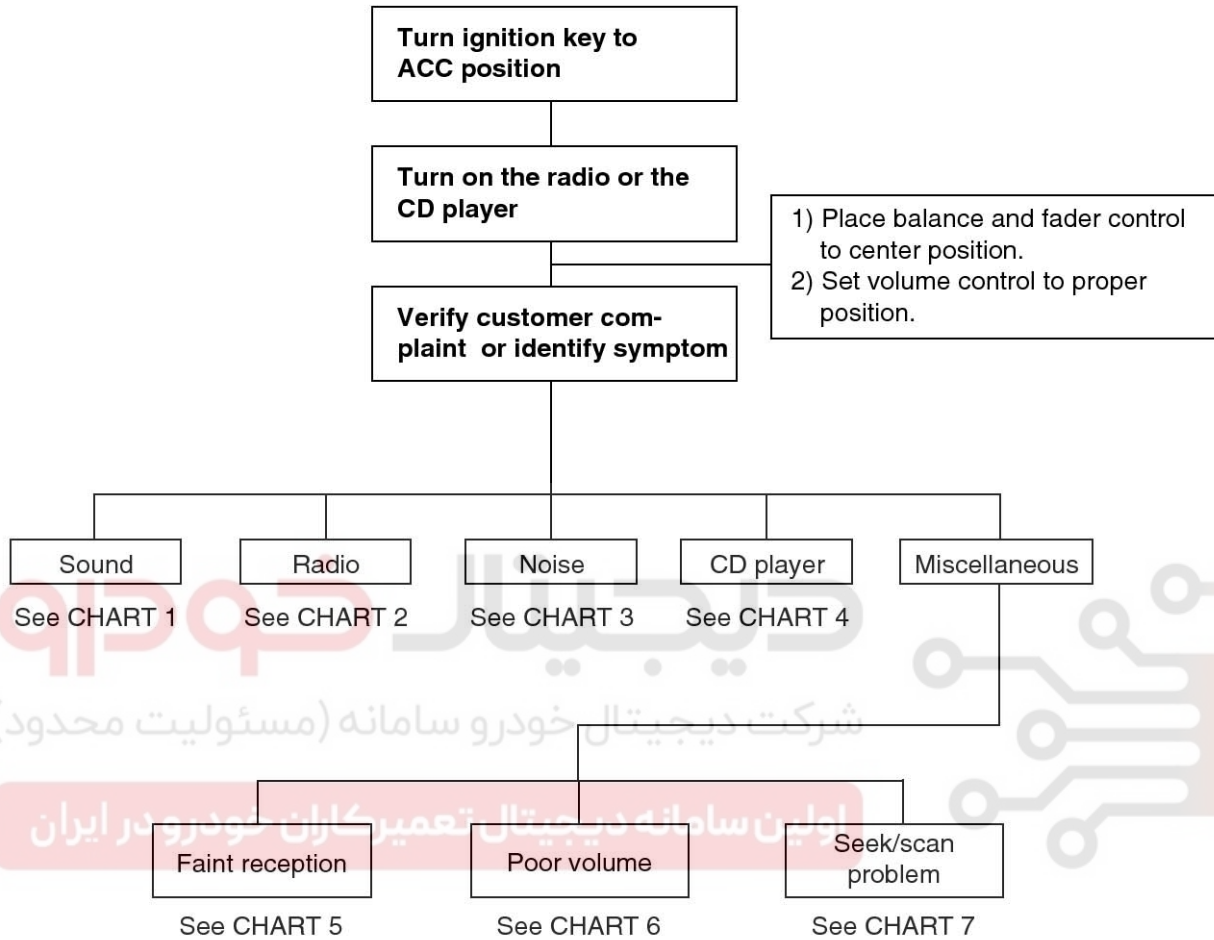


SNFBE8132L

BE-36

Body Electrical System

There are six areas where a problem can occur: wiring harness, the radio, the CD player, and speaker. Troubleshooting enables you to confine the problem to a particular area.

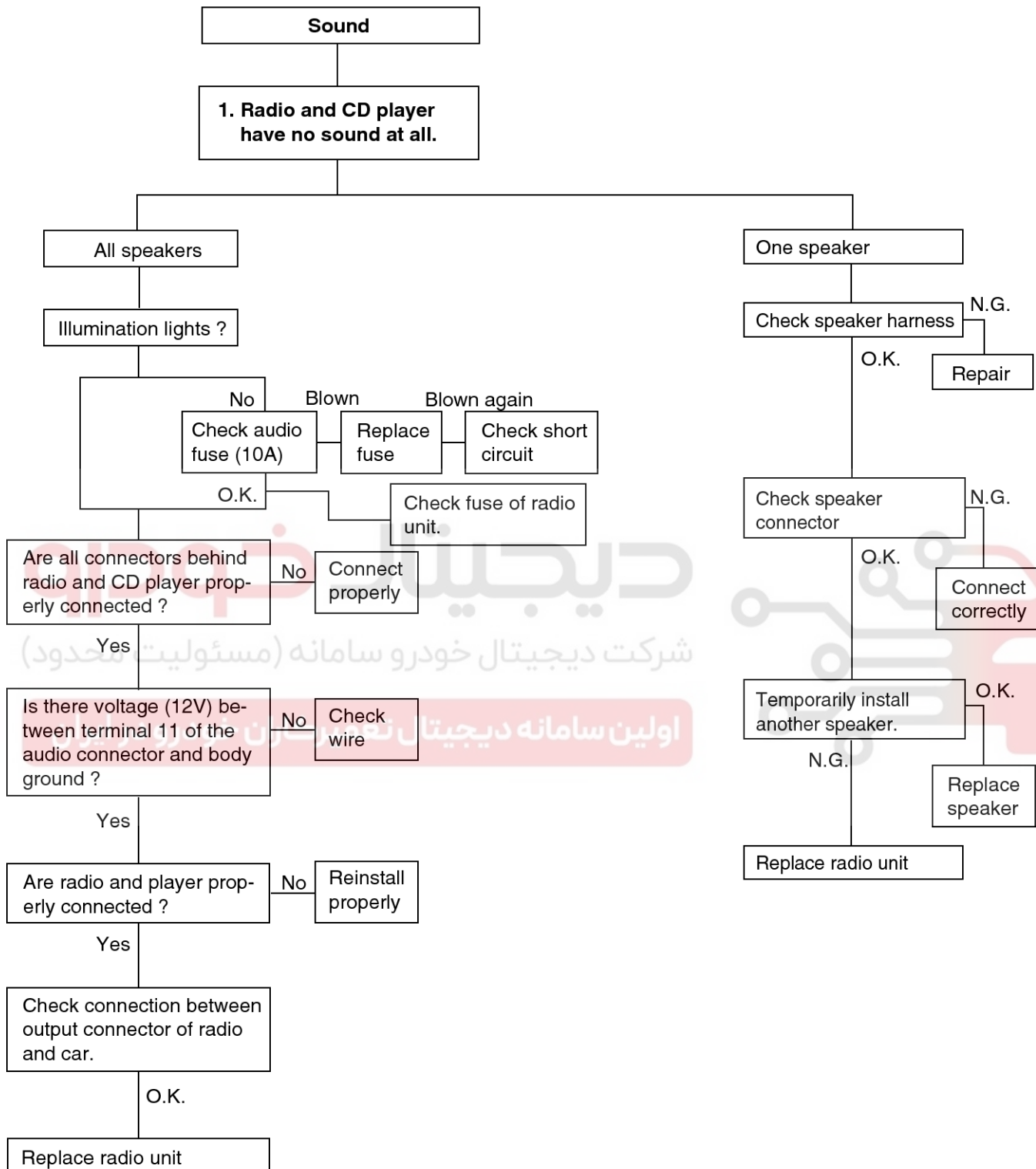


SENBE7047L

# Audio

# BE-37

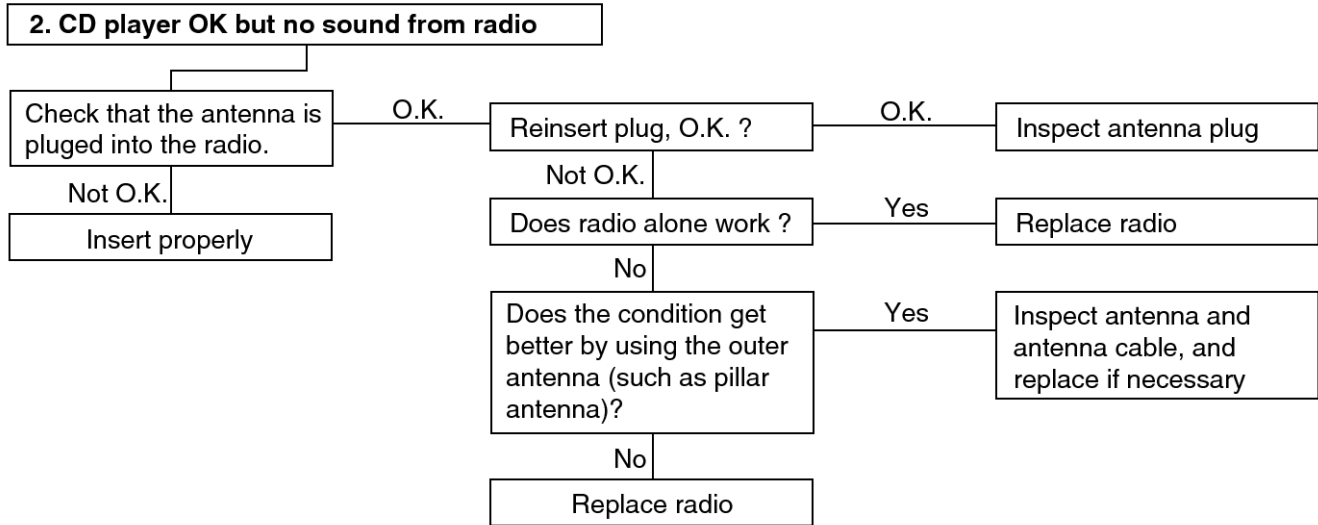
Chart 1



SENBE7048L

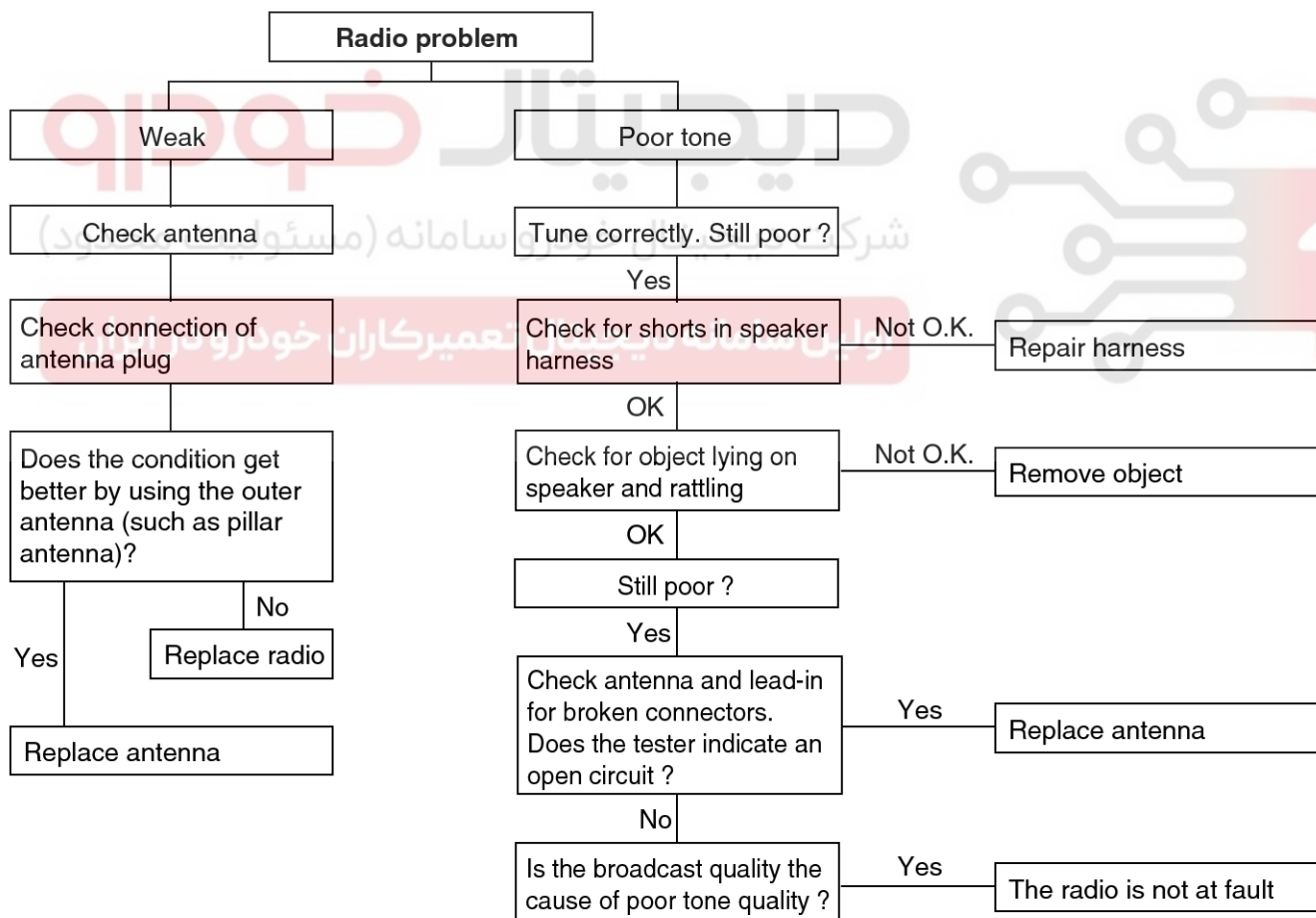
BE-38

Body Electrical System



SNFBE8133L

Chart 2



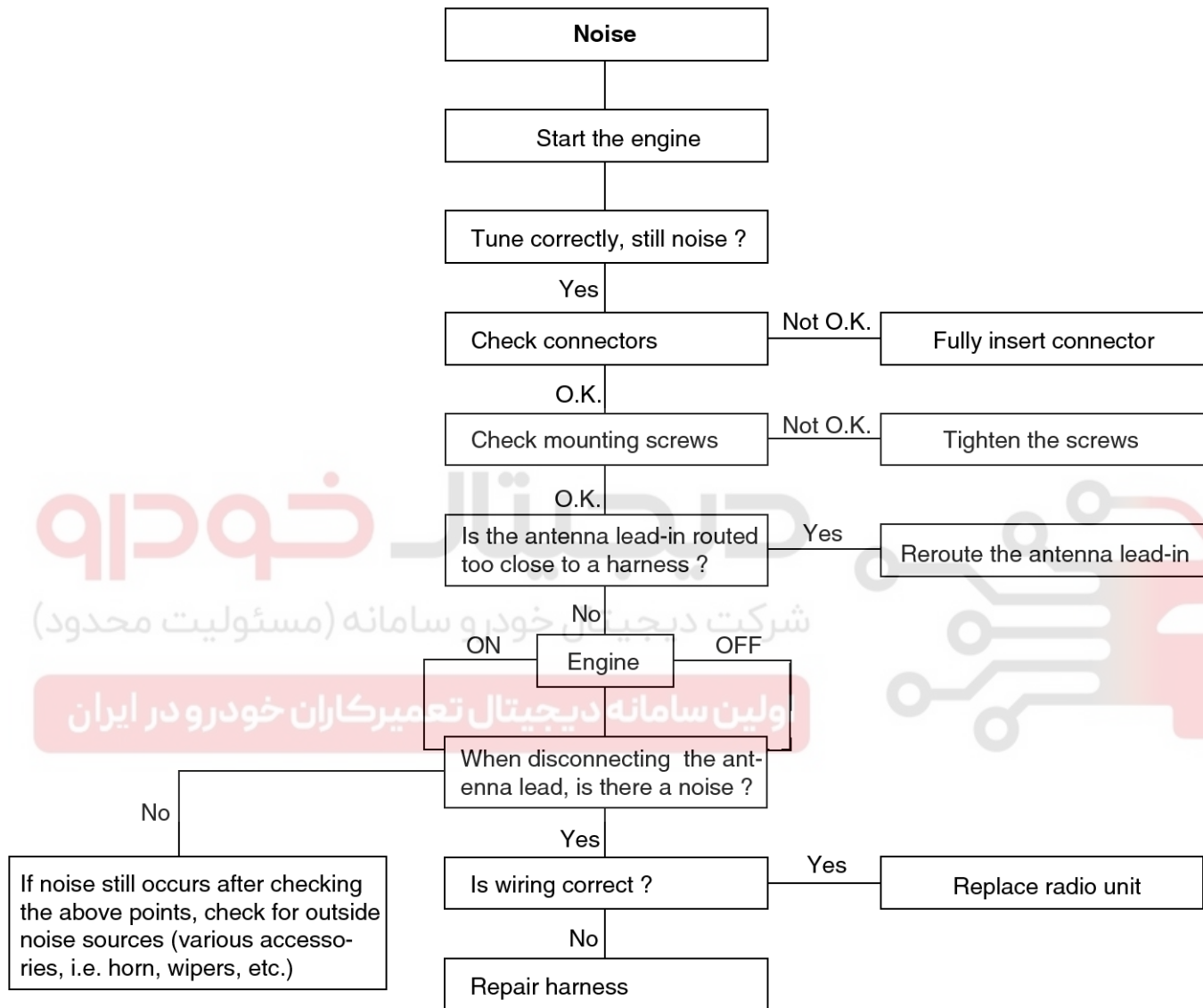
BTIF001D

# Audio

# BE-39

Chart 3

1. RADIO



SNFBE8134L

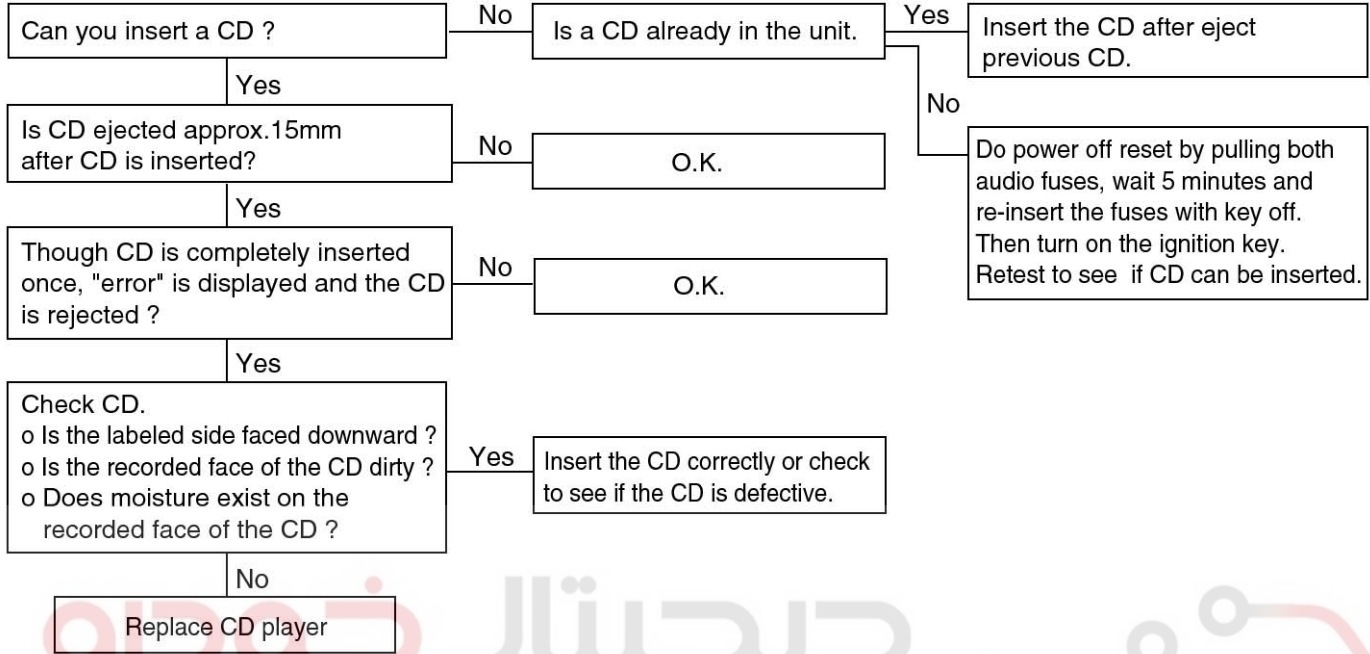


BE-40

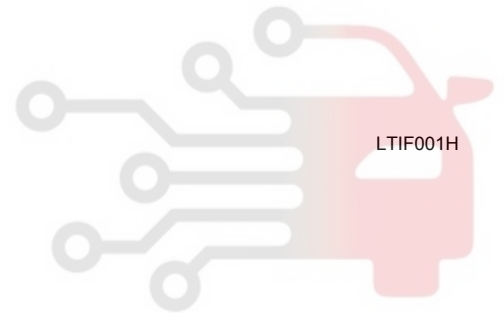
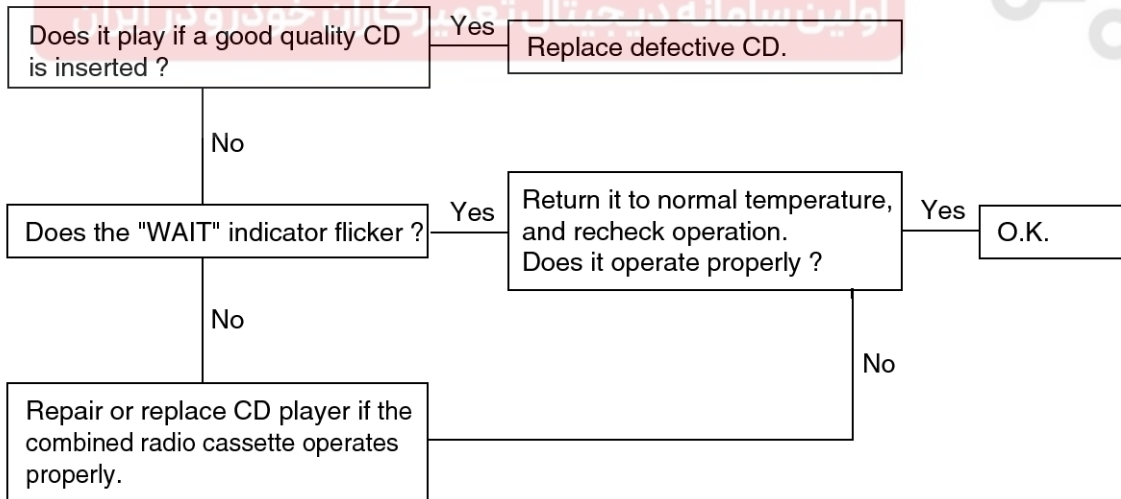
Body Electrical System

Chart 4

1. CD WILL NOT BE ACCEPTED



2. NO SOUND



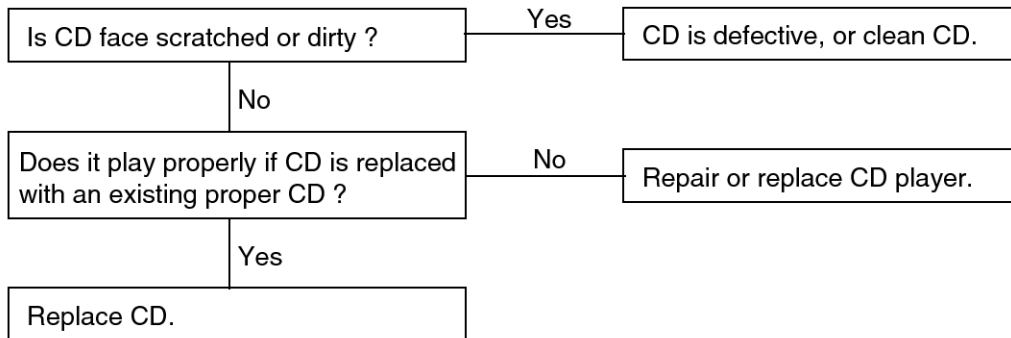
LTIF001I

# Audio

# BE-41

## 3. CD SOUND SKIPS

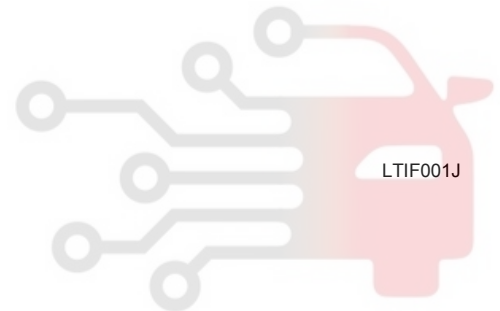
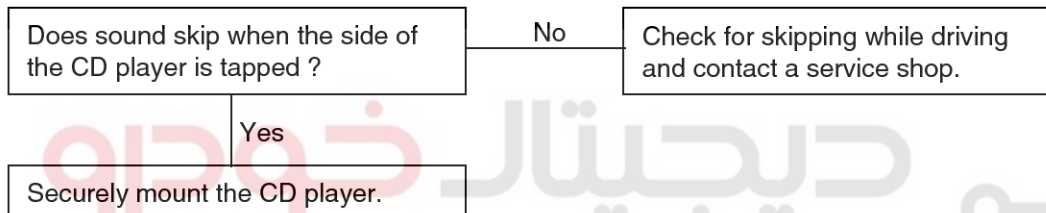
1) Sound sometimes skips when parking.



2) Sound sometimes skips when driving.

(Stop vehicle, and check it.)

(Check by using a CD which is free of scratches, dirt or other damage.)



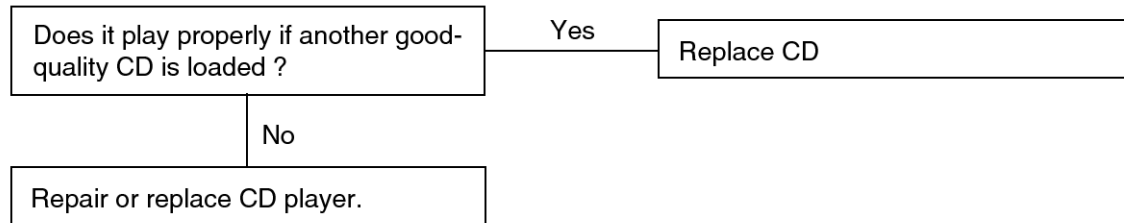
شرکت دیجیتال خودرو (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

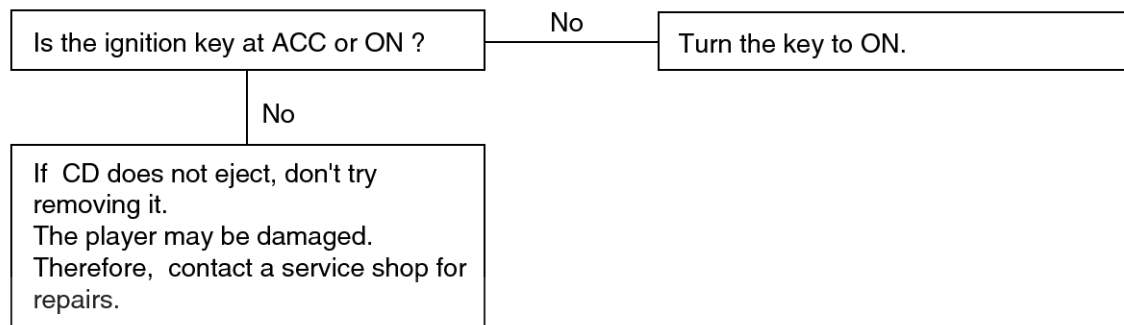
## BE-42

## Body Electrical System

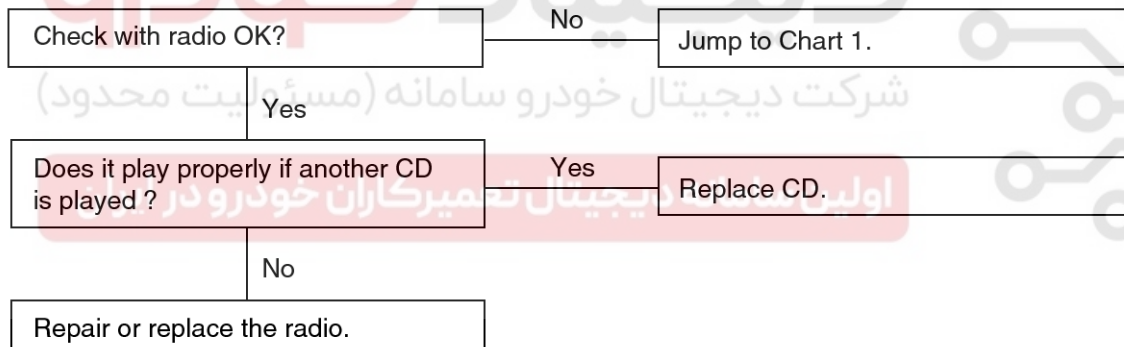
## 4. SOUND QUALITY IS POOR



## 5. CD WILL NOT EJECT



## 6. NO SOUND FROM ONE SPEAKER



SYFBE0009L

# Audio

# BE-43

Chart 5

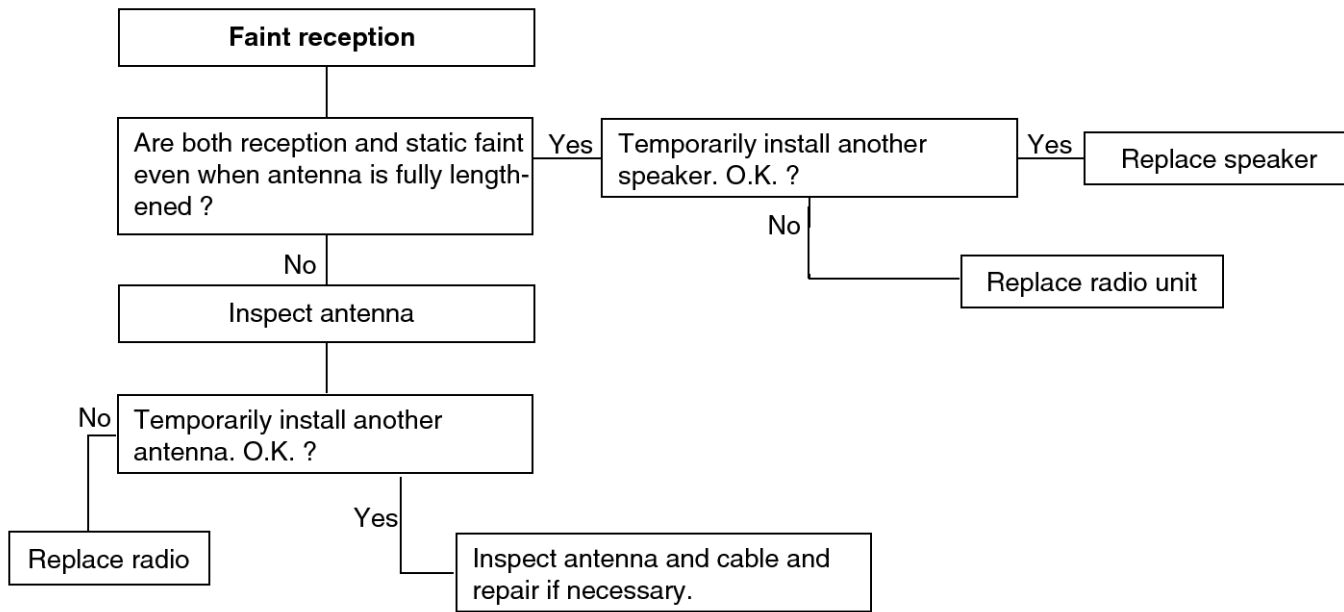
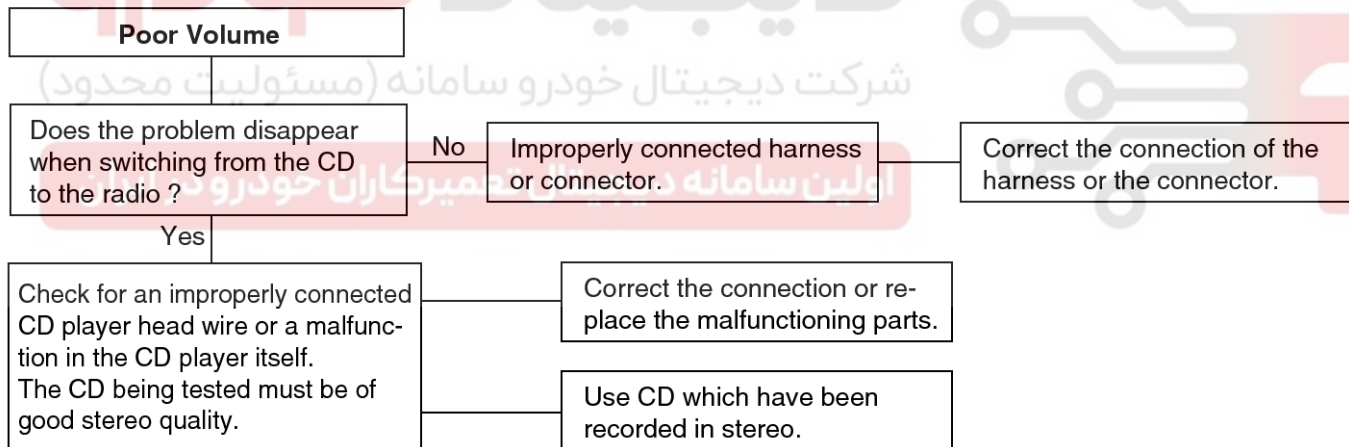


Chart 6



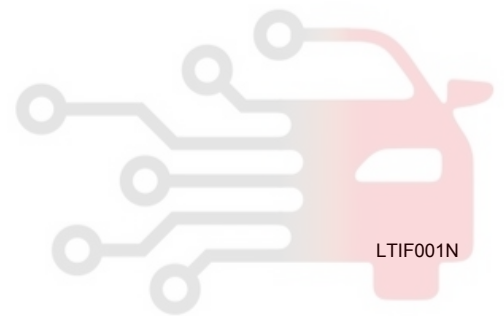
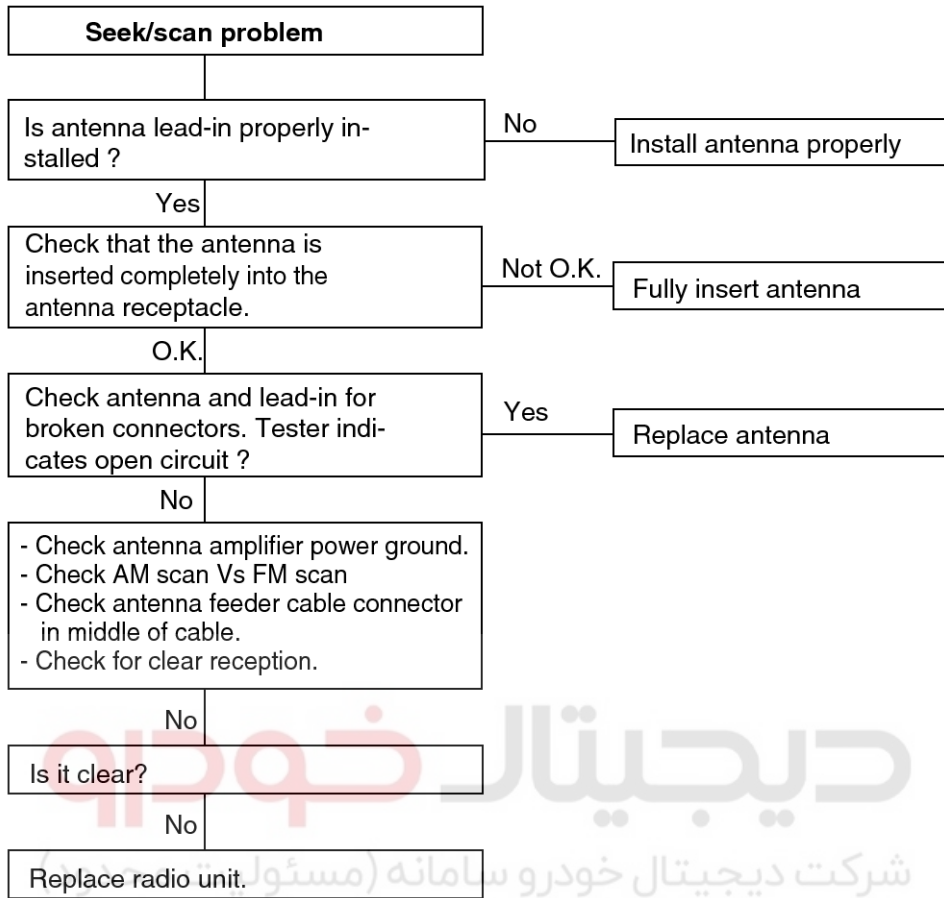
LTIF001L

SENBE7039L

# BE-44

# Body Electrical System

Chart 7



LTIF001N

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

# Multifunction switch

**BE-45**

## Multifunction switch

### Specifications

| Items                       |                                     | Specifications                                                                                            |
|-----------------------------|-------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Rated voltage               |                                     | DC 12V                                                                                                    |
| Operating temperature range |                                     | -30°C ~ +80°C (-22 ~ +176°F)                                                                              |
| Rated load                  | Dimmer & passing switch             | High : 1.0A (Relay load)<br>Low : 1.0A (Relay load)<br>Passing : 1.0A (Relay load)                        |
|                             | Lighting switch                     | Lighting : 1.0A (Relay load)                                                                              |
|                             | Turn signal & lane change switch    | 6.6 ± 0.5A (Lamp load)                                                                                    |
|                             | Front & rear fog lamp switch        | 1.0A (Relay load)                                                                                         |
|                             | Wiper & mist switch                 | Low, High : 4.0A (Motor load)<br>Intermittent : 0.22 ± 0.05A (Relay load)<br>Lock : Max. 28A (Motor load) |
|                             | Washer switch                       | 4A (Motor load)                                                                                           |
|                             | Variable intermittent volume switch | Max. 25mA                                                                                                 |

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

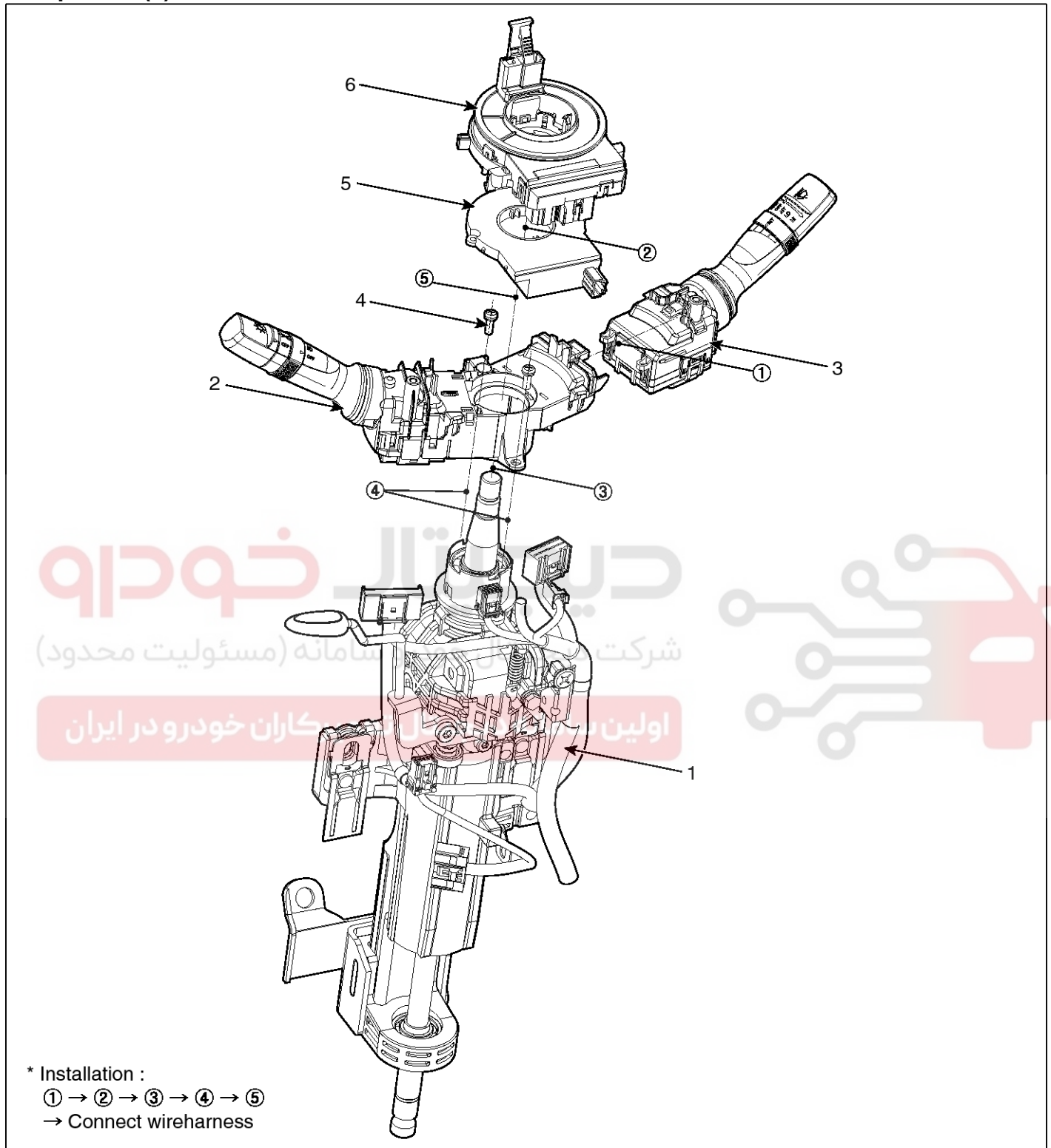
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



BE-46

Body Electrical System

Component (1)



SVGBE0225L

- 1. Steering column
- 2. Lighting switch
- 3. Wiper switch

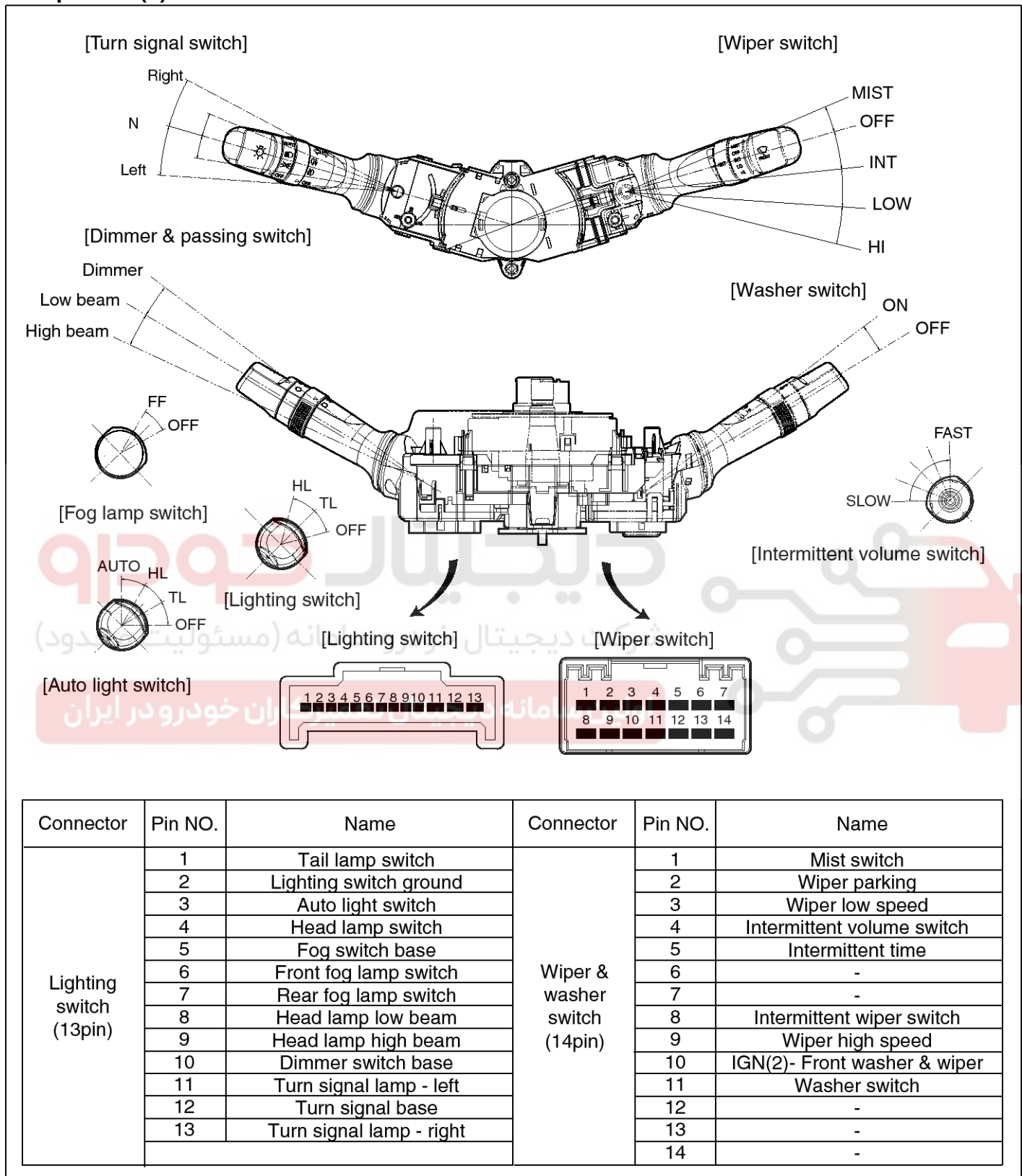
- 4. Screw
- 5. Steering angle sensor
- 6. Clock spring



# Multifunction switch

BE-47

## Component (2)



| Connector               | Pin NO. | Name                     | Connector                     | Pin NO. | Name                         |
|-------------------------|---------|--------------------------|-------------------------------|---------|------------------------------|
| Lighting switch (13pin) | 1       | Tail lamp switch         | Wiper & washer switch (14pin) | 1       | Mist switch                  |
|                         | 2       | Lighting switch ground   |                               | 2       | Wiper parking                |
|                         | 3       | Auto light switch        |                               | 3       | Wiper low speed              |
|                         | 4       | Head lamp switch         |                               | 4       | Intermittent volume switch   |
|                         | 5       | Fog switch base          |                               | 5       | Intermittent time            |
|                         | 6       | Front fog lamp switch    |                               | 6       | -                            |
|                         | 7       | Rear fog lamp switch     |                               | 7       | -                            |
|                         | 8       | Head lamp low beam       |                               | 8       | Intermittent wiper switch    |
|                         | 9       | Head lamp high beam      |                               | 9       | Wiper high speed             |
|                         | 10      | Dimmer switch base       |                               | 10      | IGN(2)- Front washer & wiper |
|                         | 11      | Turn signal lamp - left  |                               | 11      | Washer switch                |
|                         | 12      | Turn signal base         |                               | 12      | -                            |
|                         | 13      | Turn signal lamp - right |                               | 13      | -                            |
|                         |         |                          |                               | 14      | -                            |

SVGBE0041L

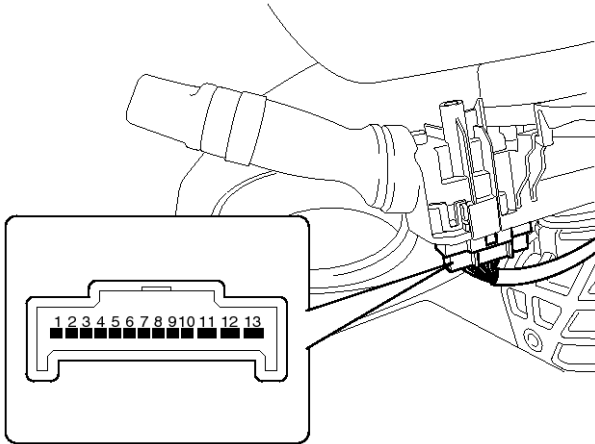
# BE-48

# Body Electrical System

## Inspection

### Lighting Switch Inspection

With the multi function switch in each position, make sure that continuity exists between the terminals below. If continuity is not as specified, replace the multi-function switch.



SVGB10078D

### Lighting Switch (Auto Light)

| Terminal Position | 1 | 2 | 4 | 3 |
|-------------------|---|---|---|---|
| OFF               |   |   |   |   |
| Tail              | ○ | ○ |   |   |
| Head lamp         | ○ | ○ | ○ |   |
| AUTO              |   | ○ |   | ○ |

SVGBE0042L

### Lighting Switch

| Terminal Position | 1 | 2 | 4 |
|-------------------|---|---|---|
| OFF               |   |   |   |
| Tail              | ○ | ○ |   |
| Head lamp         | ○ | ○ | ○ |

SVGBE0043L

### Dimmer And Passing Switch

| Terminal Position | 10 | 8 | 9 | 2 |
|-------------------|----|---|---|---|
| HU                | ○  | ○ | ○ |   |
| HL                | ○  | ○ |   |   |
| P                 | ○  |   | ○ | ○ |

SVGBE0044L

HU : Head lamp high beam

HL : Head lamp low beam

P : Head lamp passing switch

### Turn Signal Switch

| Hazard switch | Terminal Trun signal switch | 12 | 11 | 13 |
|---------------|-----------------------------|----|----|----|
| OFF           | L                           | ○  | ○  |    |
|               | N                           |    |    |    |
|               | R                           | ○  |    | ○  |

SVGBE0045L

### Front Fog Lamp Switch

| Terminal Position | 5 | 6 |
|-------------------|---|---|
| OFF               |   |   |
| ON                | ○ | ○ |

SVGBE0046L

### Front & Rear Fog Lamp Switch

| Terminal Position | 5 | 6 | 7 |
|-------------------|---|---|---|
| OFF               |   |   |   |
| Front             | ○ | ○ |   |
| Rear              | ○ | ○ | ○ |

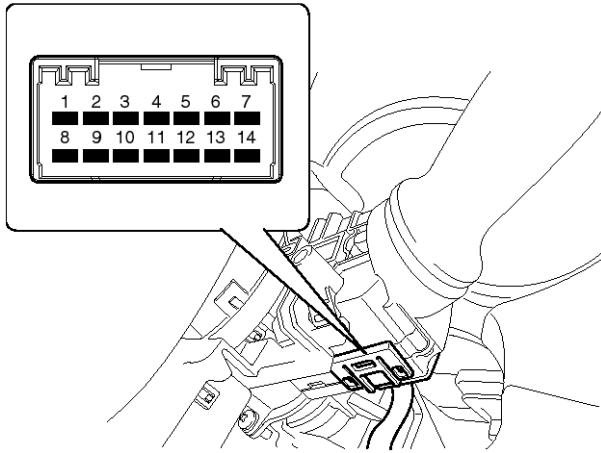
SVGBE00226L

# Multifunction switch

# BE-49

## Wiper And Washer Switch Inspection

With the multi function switch in each position, make sure that continuity exists between the terminals below. If continuity is not as specified, replace the multi-function switch.



SVGB10079D

## Wiper Switch

| Terminal<br>Position | 3 | 9 | 2 | 8 | 10 | 1 | 4 | 5 |
|----------------------|---|---|---|---|----|---|---|---|
| MIST                 | ○ | ○ |   |   | ○  | ○ |   |   |
| OFF                  | ○ | ○ |   |   |    |   |   |   |
| INT                  | ○ | ○ | ○ | ○ | ○  |   | ○ | ○ |
| LOW                  | ○ | ○ | ○ | ○ | ○  |   |   |   |
| HI                   |   | ○ | ○ | ○ | ○  |   |   |   |

SVGBE0047L

## Washer Switch

| Terminal<br>Position | 10 | 11 |
|----------------------|----|----|
| OFF                  |    |    |
| ON                   | ○  | ○  |

SVGBE0048L



## BE-50

## Body Electrical System

## Inspection (With GDS)

1. Check BCM input/output specification of multifunction switch using the GDS. If the specification is abnormal, replace the lamp or wiper switch.
2. If diagnosis is required on the multifunction switch, select model and "IPM".
3. To consult the present input/output value of BCM, "Current DATA". It provides information of BCM input/output conditions of power supply, turn signal/brake lamp, headlamp, door, locks, outside mirror, wiper, auto-light and transmitters etc.

| Current Data                                                    |                |        |
|-----------------------------------------------------------------|----------------|--------|
| Standard Display                                                | Full List      | Graph  |
| Items List                                                      | Reset Min.Max. | Record |
| Stop                                                            |                |        |
| Sensor Name                                                     | Value          | Unit   |
| <input type="checkbox"/> Key in switch(Manual Key Type)         | OUT            | -      |
| <input type="checkbox"/> ACC                                    | ON             | -      |
| <input type="checkbox"/> IGN1                                   | OFF            | -      |
| <input type="checkbox"/> IGN2                                   | OFF            | -      |
| <input type="checkbox"/> Tail Lamp Switch                       | OFF            | -      |
| <input type="checkbox"/> Head Lamp Switch                       | OFF            | -      |
| <input type="checkbox"/> Auto Light Switch                      | OFF            | -      |
| <input type="checkbox"/> Head Lamp High Switch                  | OFF            | -      |
| <input type="checkbox"/> Turn Left SW                           | OFF            | -      |
| <input type="checkbox"/> Turn Right SW                          | OFF            | -      |
| <input type="checkbox"/> Front Fog Switch                       | ON             | -      |
| <input type="checkbox"/> Rear Fog Switch                        | OFF            | -      |
| <input type="checkbox"/> Hazard Switch                          | OFF            | -      |
| <input type="checkbox"/> Defogger / Deicer SW                   | OFF            | -      |
| <input type="checkbox"/> Washer Switch                          | OFF            | -      |
| <input type="checkbox"/> INT Switch                             | OFF            | -      |
| <input type="checkbox"/> Mist Switch                            | OFF            | -      |
| <input type="checkbox"/> Wiper Stop Position SW                 | Stop           | -      |
| <input type="checkbox"/> Key Inter Lock Switch(Manual Key Type) | ON             | -      |
| <input type="checkbox"/> Start Inhibitor Relay                  | OFF            | -      |
| <input type="checkbox"/> Rear Left Power Window Up Output Relay | OFF            | -      |

SVGBE0227L

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

# Multifunction switch

**BE-51**

4. To perform compulsory operation on BCM input factors, select "ACTUATION TEST".

Actuation Test

| Test Items                    |  |
|-------------------------------|--|
| Trunk release relay           |  |
| Burglar horn relay            |  |
| Wiper low relay               |  |
| Wiper high relay              |  |
| Head lamp washer relay        |  |
| Head lamp low signal          |  |
| Start Inhibit Relay           |  |
| Rear power window power       |  |
| Rear Power Window LH UP Relay |  |
| Rear Power Window LH DN Relay |  |
| Rear Power Window RH UP Relay |  |
| Rear Power Window RH DN Relay |  |
| Tail Lamp Output              |  |
| Head lamp low Output          |  |
| Head lamp high Output         |  |
| Turn LH Output                |  |

Start

Stop

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

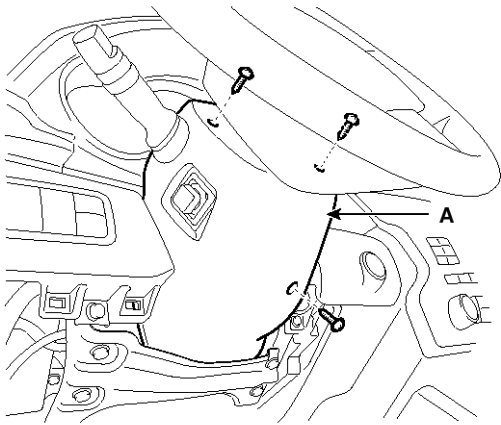
SVGBE0228L

# BE-52

# Body Electrical System

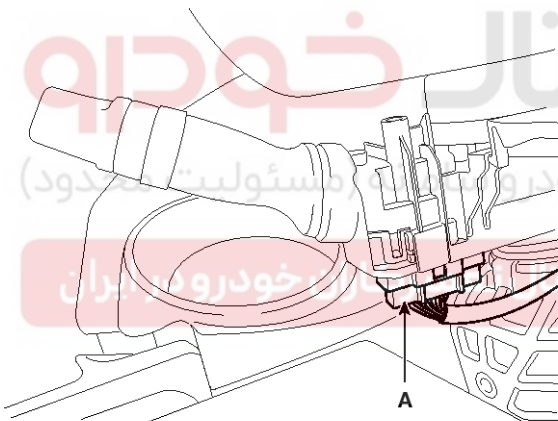
## Removal

1. Remove the steering column upper and lower shrouds after removing 3 screws.

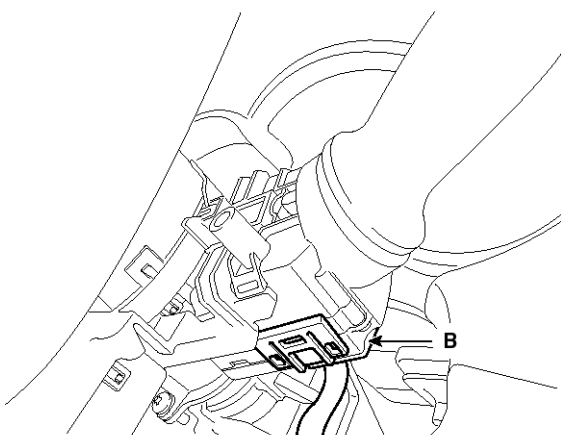


SVGBE0041D

2. Disconnect the lighting switch connector (A) and wiper & washer switch connector (B).

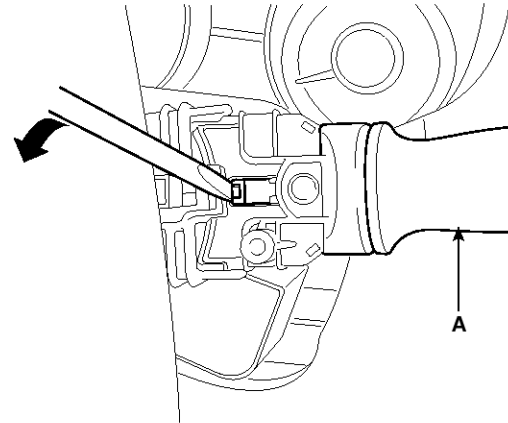


SVGB10075D



SVGB10076D

3. If necessary of removing the wiper & washer switch (A), release the lock of wiper switch using tool without removing the steering wheel and the clock spring.

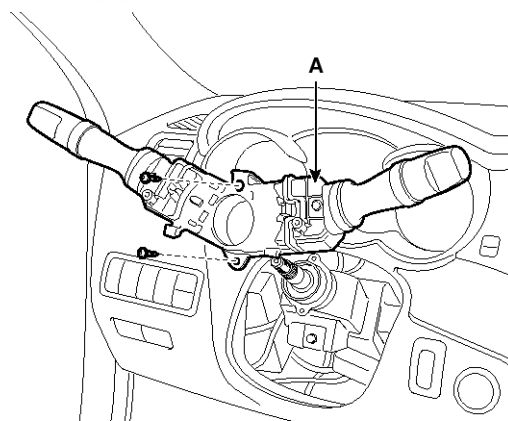


SVGB10077D

### NOTICE

When removing the wiper & washer switch only, release the lock of wiper switch without removing the steering wheel.

4. Remove the steering wheel.  
(Refer to the ST group - "Steering column & shaft")
5. Remove the clock spring.  
(Refer to the RT group - "Airbag module")
6. Remove the multifunction switch assembly (A) after loosening the mounting screws (2EA).



SVGBE0044D

# Multifunction switch

**BE-53**

## Installation

1. Install the multifunction switch.
2. Install the clock spring and steering.
3. Install the steering column upper and lower shrouds.
4. Install the steering wheel.

### NOTICE

*Make sure the multifunction switch connectors are plugged in properly.*

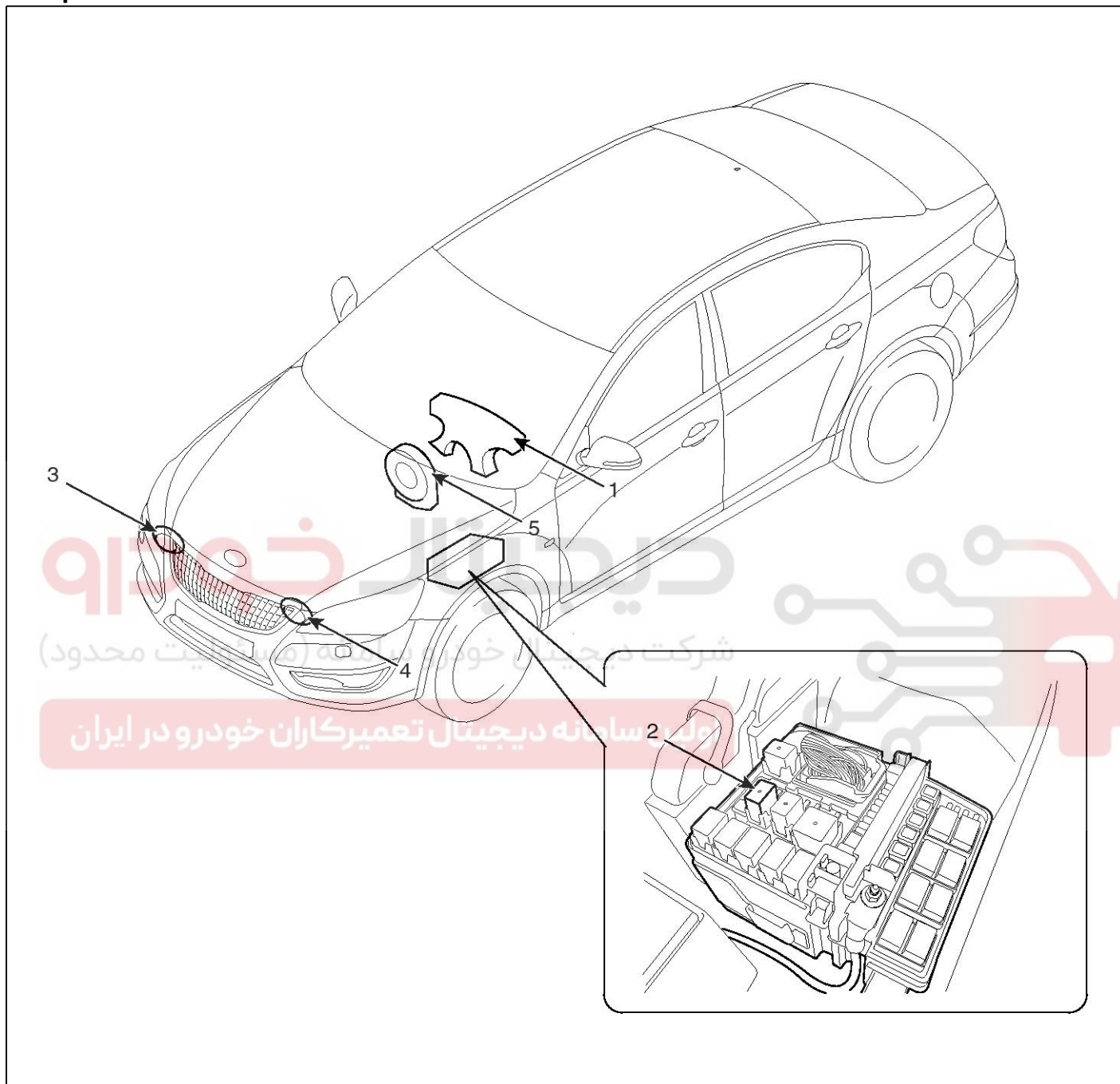
# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران





**BE-54****Body Electrical System****Horn****Component Location**

SVGBE0048D

1. Horn switch
2. Horn relay (Engine room compartment)
3. Horn - High pitch

4. Horn - Low pitch
5. Clock spring

# Horn

# BE-55

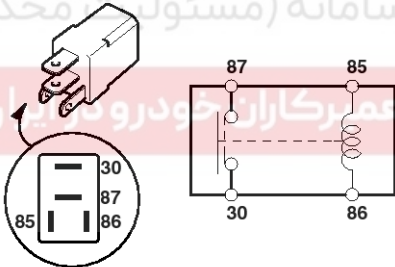
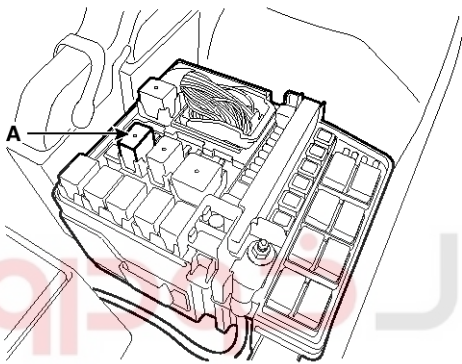
## Inspection

Test the horn by connecting battery voltage to the 1 terminal and ground the 2 terminal.

The horn should make a sound. If the horn fails to make a sound, replace it.

## Horn Relay Inspection

1. Remove the horn relay (A) from the engine room relay box.
2. There should be continuity between the No.30 and No.87 terminals when power and ground are connected to the No.85 and No.86 terminals.
3. There should be no continuity between the No.30 and No.87 terminals when power is disconnected.



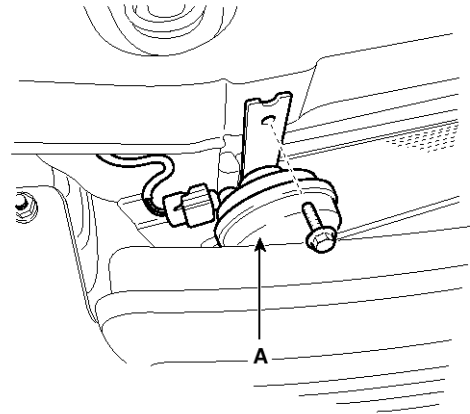
SVGBE0052D

| Terminal Position | 30    | 87 | 85    | 86 |
|-------------------|-------|----|-------|----|
| Disconnected      |       |    | ○ — ○ |    |
| Connected         | ○ — ○ |    | ⊖ — ⊕ |    |

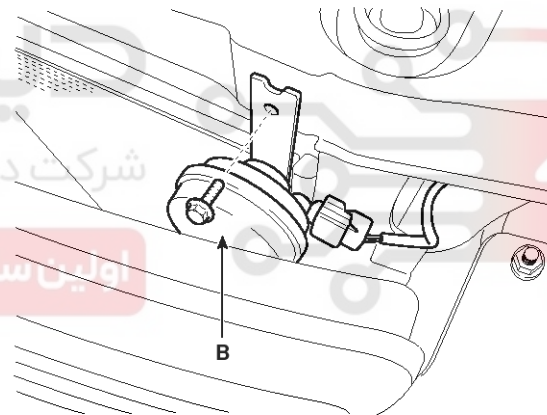
SBKBE9020L

## Removal

1. Remove the radiator grill upper guide.  
(Refer to the BD group - "Front bumper")
2. Remove the mounting nut and disconnect the horn connector, then remove the high pitch horn (A) and low pitch horn (B).



SVGBE0049D



SVGBE0050D

## Installation

1. Connect the horn connector, then reassemble the horn.
2. Reassemble the radiator grill upper guide.

## BE-56

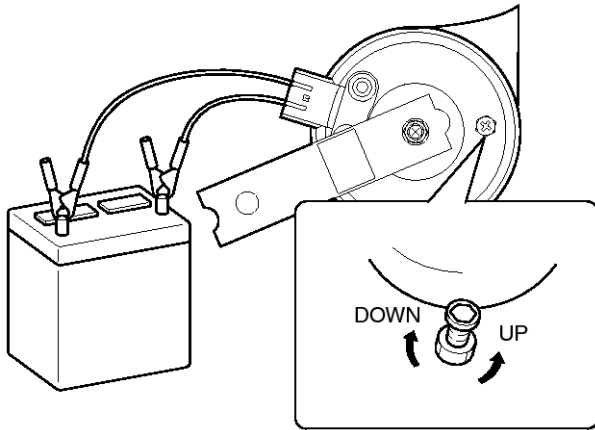
## Body Electrical System

### Adjustment

Operate the horn, and adjust the tone to a suitable level by turning the adjusting screw.

### NOTICE

After adjustment, apply a small amount of paint around the screw head to keep it from loosening.



SVGBE0051D

# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



# AVN System

# BE-57

## AVN System

### Specifications

| Item                            | Specification                                                                                 |
|---------------------------------|-----------------------------------------------------------------------------------------------|
| Power source                    | DC 14.4V (-) ground                                                                           |
| Frequency range / Channel space | FM : 87.5 ~ 108 MHz / 100 KHz<br>AM : 531 ~ 1602 KHz / 9 KHz                                  |
| Tuning type                     | PLL SYNTHESIZED TUNING                                                                        |
| Impedance                       | 2 ohm x 4                                                                                     |
| Antenna                         | 80 pF 75 Ohm                                                                                  |
| Dark current                    | MAX 4mA (Head unit only)                                                                      |
| S/N                             | FM : MIN 50 dB<br>AM : MIN 40 dB                                                              |
| Temperature range               | Operating : -20 °C ~ +70 °C (-4 °F ~ +158 °F)<br>Storage : -30 °C ~ +80 °C (-22 °F ~ +316 °F) |

### GPS

| Item              | Specification |
|-------------------|---------------|
| Frequency         | 1.57542 GHz   |
| Sensitivity level | - 144 dbm     |
| Channel           | 12CH          |

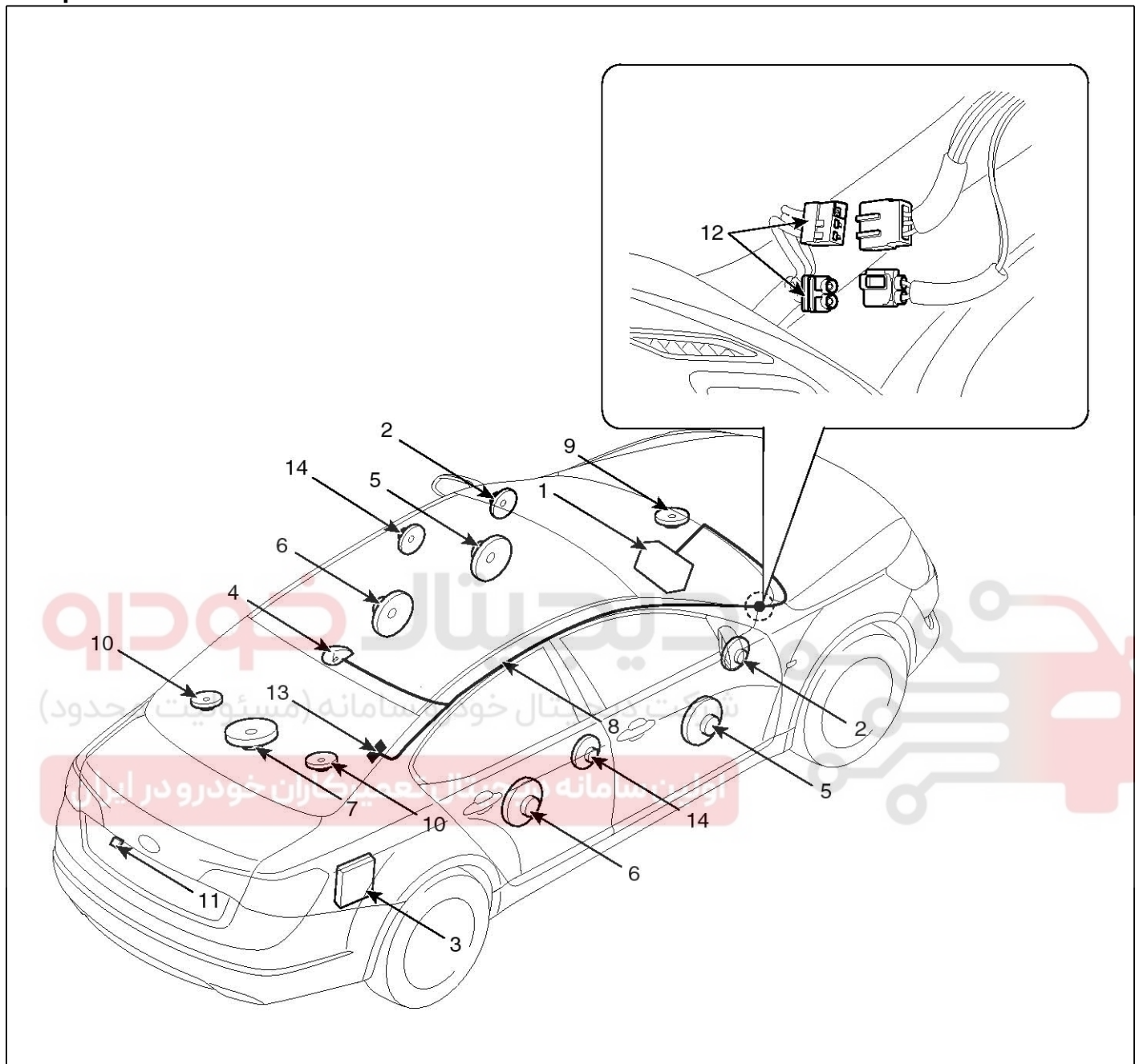
### Speaker

| Item                 | Specification |           |
|----------------------|---------------|-----------|
| Input power (W or V) | Front         | Max 50W   |
|                      | Rear          | Max 50W   |
|                      | Front center  | Max 30W   |
|                      | Front tweeter | Max 40W   |
|                      | Rear tweeter  | Max 40W   |
|                      | Rear surround | Max 50W   |
|                      | Sub woofer    | MAX 40W   |
| Impedance (Ω)        | Front         | 4 ± 0.6   |
|                      | Rear          | 2 ± 0.3   |
|                      | Front center  | 2 ± 0.3   |
|                      | Front tweeter | 3.4 ± 0.6 |
|                      | Rear tweeter  | 3.4 ± 0.5 |
|                      | Rear surround | 2 ± 0.3   |
|                      | Sub woofer    | 2 ± 0.3   |
| Number of speaker    | 12            |           |

# BE-58

# Body Electrical System

## Components Location



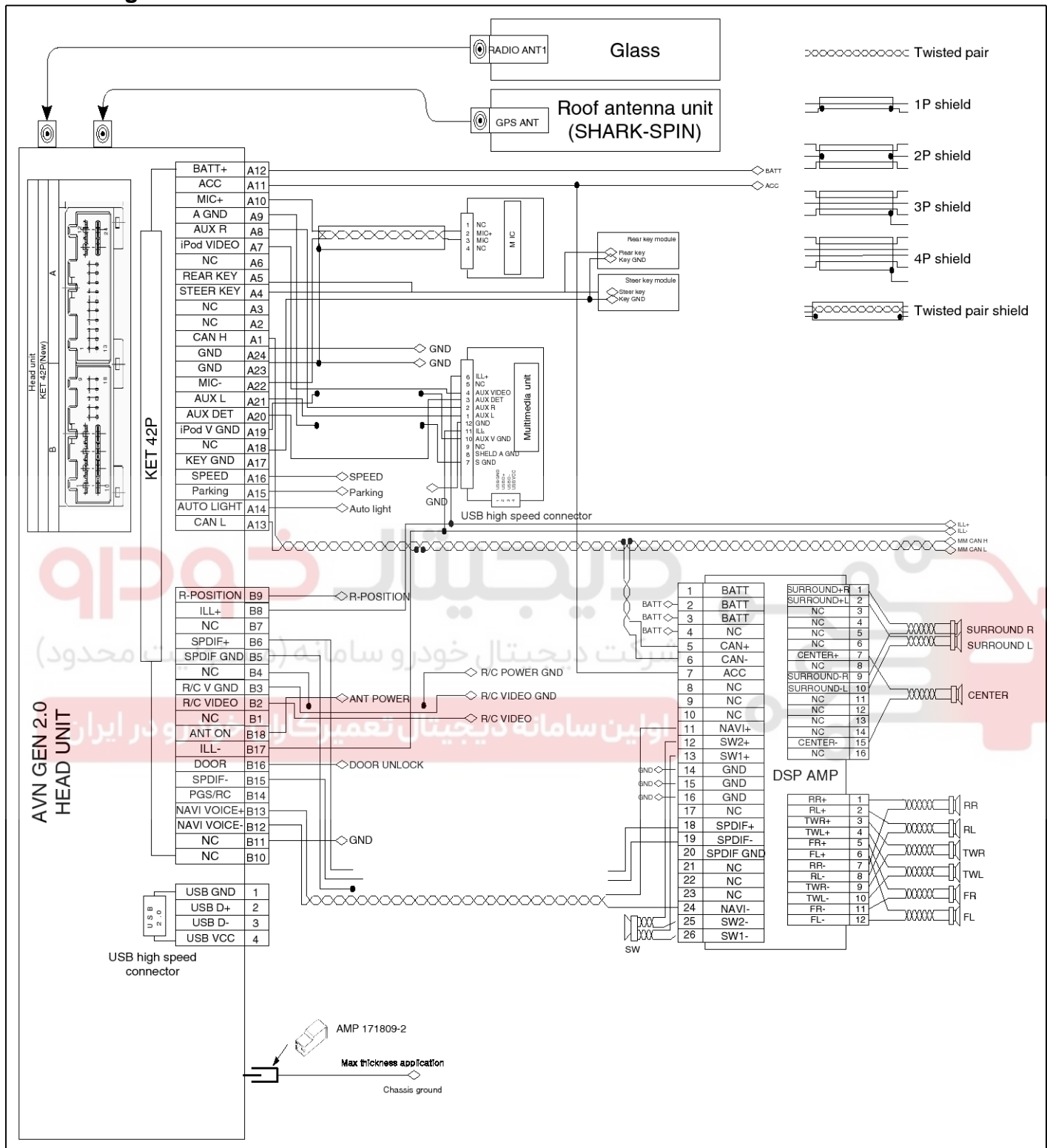
SVGBE0053D

- |                                     |                                   |
|-------------------------------------|-----------------------------------|
| 1. AVN (A/V & Navigation head unit) | 8. Antenna feeder cable           |
| 2. Front tweeter speaker            | 9. Feeder cable joint connector   |
| 3. External amplifier               | 10. Glass antenna (Option)        |
| 4. Roof antenna (GPS)               | 11. Back view camera              |
| 5. Front door speaker               | 12. Feeder cable joint connector  |
| 6. Rear door speaker                | 13. Glass antenna (Radio)         |
| 7. Sub woofer speaker               | 14. Rear tweeter speaker (Option) |

# AVN System

# BE-59

## Circuit Diagram



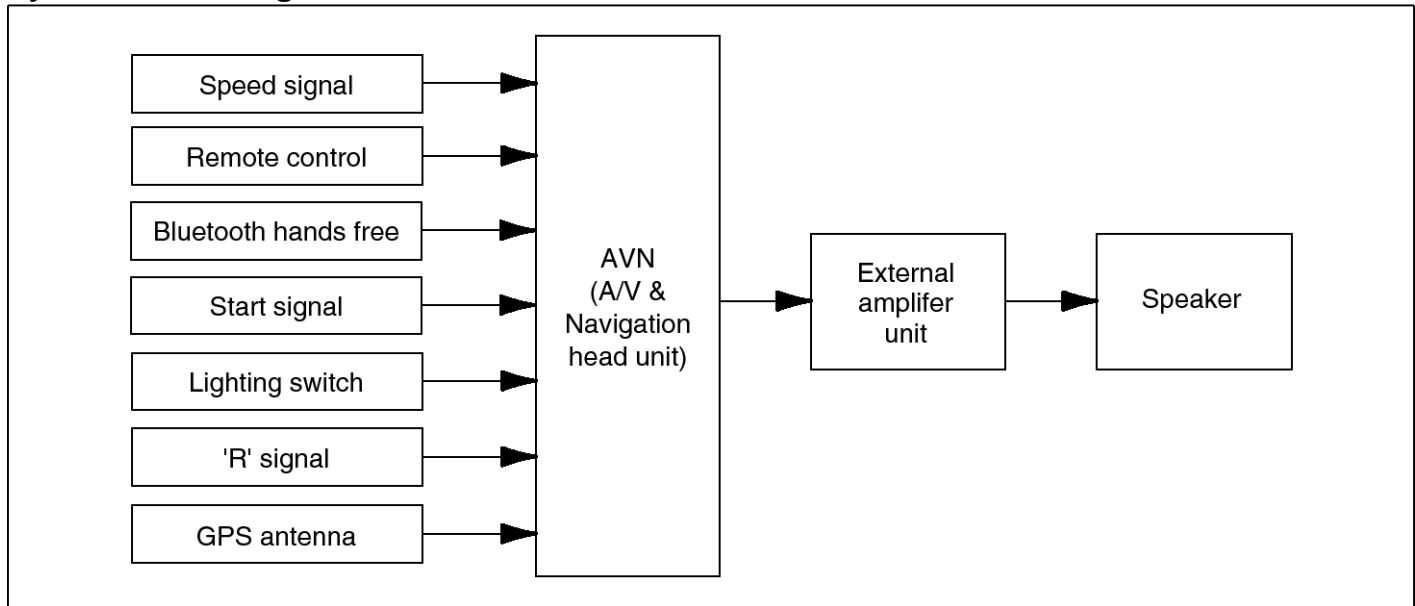
SVGBE0229L



## BE-60

## Body Electrical System

## System Block Diagram



SVGBE0049L

## Limitations Of The Navigation system

## GPS Signal Reception State

As the GPS satellite frequency is received/transmitted in straight lines, reception may not work if hiding devices are placed on or near the GPS antenna or when traveling through the following locations.

- Tunnels
- Basement parking structures
- Underneath an overpass
- Roads within forested areas
- Areas near high rise buildings
- Roads within canyons

## Vehicle Position Display

1. If multipass errors occur due to reflections from buildings or related causes, the current position mark on the navigation may differ from the actual position of the vehicle.
2. The position of the vehicle on the navigation may be different from the actual position if the vehicle is under the occur, driving for a short period of time will vehicle through map matching or GPS information (several minutes may be necessary in certain cases).
  - When driving on a Y-shaped road with a narrow angle, the current position may be displayed in the opposite direction.

- If the vehicle is loaded onto a car transport vehicle, the current position mark may be stalled on the last position prior to loading.
- When driving on a spiral-shaped road.
- When driving in mountain regions with sharp turns or sudden brakes.
- When entering a road after having been in an underground parking structure, building parking structure, or turnable with many rotations.
- When the tires have recently been replaced (Especially upon use of spare or studless tires)
- If the battery terminal is removed.
- When driving in city streets, the current position may be displayed on the opposite side or on an off-road position.
- When changing the zoom level from the maximum zoom in level to a different zoom level, the current position mark may be displayed on a different road.
- When driving in heavy traffic with frequent go - stops in traffic or intersections.
- When driving under slippery conditions, such as heavy sand, snow, etc.
- When driving with the tire chain in place.
- When using a tire with an incorrect size specification.



## AVN System

## BE-61

- When the tire pressure for the 4 tires are different.
- When the replacement tire is a worn or used tire (Especially studless tires having passed a 2nd seasons, etc.)
- When driving near high-rise buildings
- If a roof carrier has been installed
- When driving under high speeds or having calculated a long-distance route.

### Route Guidance

Suitable route guidance may not occur caused by search conditions or the driving position.

- Guidance to go straight may be given while driving on a straight road.
- Guidance may not be given even when having turned at an intersection.
- There are certain intersections in which guidance may not occur.
- A route guidance signaling entrance into a no enter zone may occur (No enter zone, road under construction, etc.)
- Guidance may be given to a position removed from the actual destination if roads to reach the actual destination do not exist or are too narrow.
- Faulty voice guidance may be given if the vehicle breaks from the designated route (ex : if a turn is made at an intersection while the navigation provided guidance to go straight).
- Map Data may be missing or incorrect causing route guidance to not be given.

### Route Re-calculation

The following phenomena may occur after conducting route recalculation.

- Guidance may be given to a position differing from the current position when turning at an intersection.
- Route recalculation may take a longer period of time when driving under high speeds.
- A route guidance signaling for a U-Turn in a No U-Turn location may occur.
- A route guidance signaling entrance into a no enter zone may occur (No enter zone, road under construction, etc).
- Guidance may be given to a position removed from the actual destination do not exist or are too narrow.
- Faulty voice guidance may be given if the vehicle breaks from the designated route (ex : if a turn is made at an intersection while the navigation provided guidance to go straight)

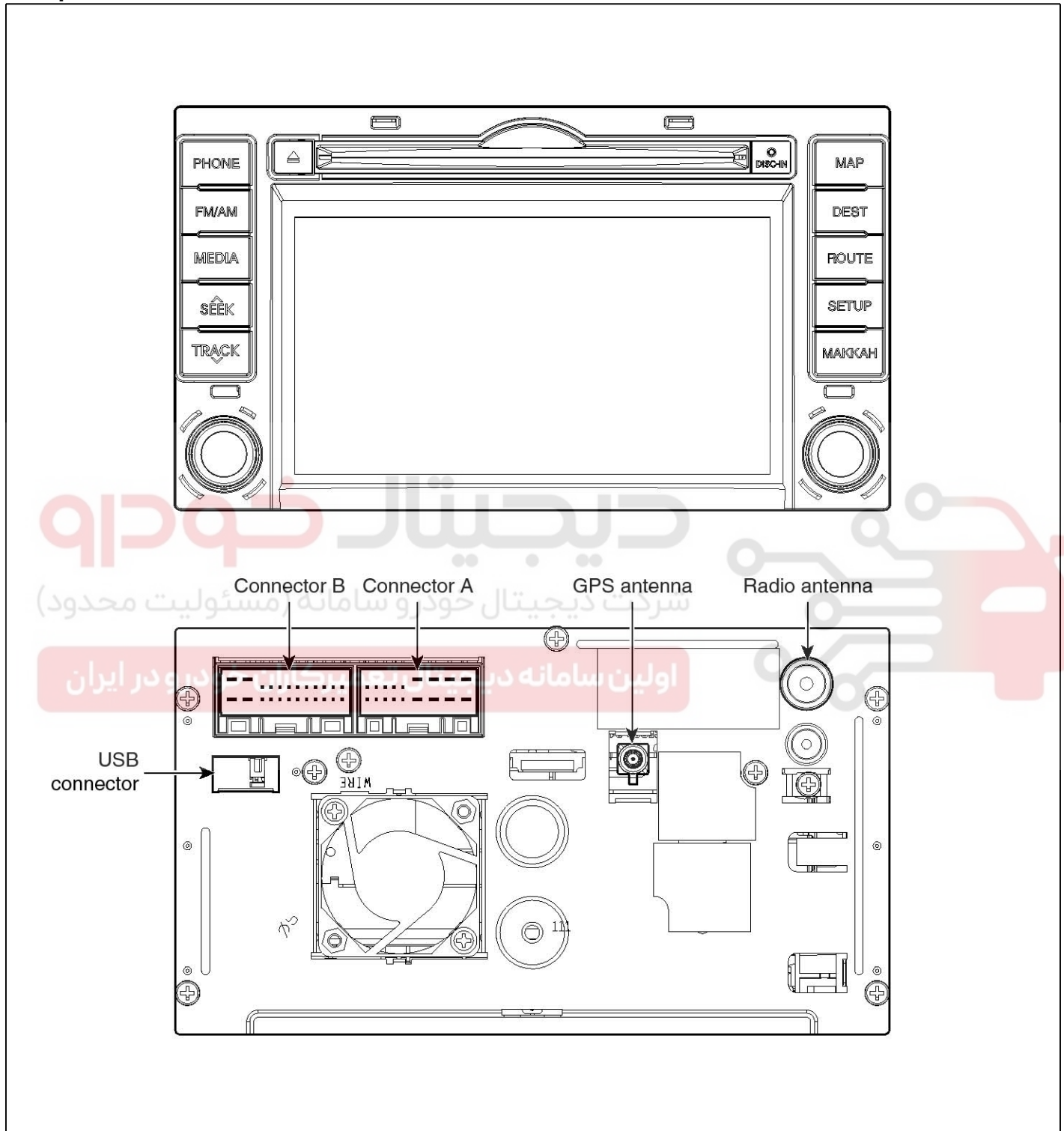


# BE-62

# Body Electrical System

## AVN Head Unit

### Components

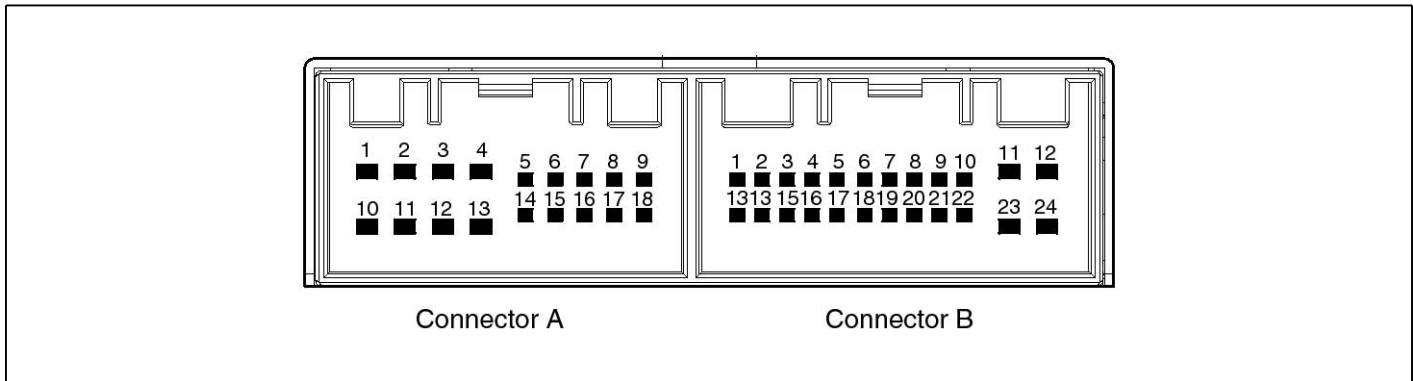


SVGBE0050L

# AVN System

# BE-63

## AVN (A/V & Navigation) Head Unit Connector

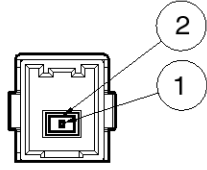
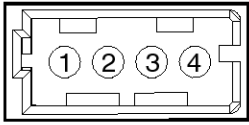
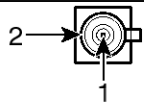


SVGBE0051L

| Pin No. | Connector A              | Connector B             |
|---------|--------------------------|-------------------------|
| 1       | -                        | CAN H                   |
| 2       | Rear camera video        | -                       |
| 3       | Rear camera video ground | -                       |
| 4       | -                        | Steering remote control |
| 5       | SPDIF ground             | Rear remote control     |
| 6       | SPDIF (+)                | -                       |
| 7       | -                        | iPod video              |
| 8       | Illumination (+)         | AUX input (RH)          |
| 9       | R Position               | AUX Ground              |
| 10      | -                        | MIC+ (Bluetooth)        |
| 11      | -                        | ACC (+)                 |
| 12      | NAVI voice (-)           | Battery (+)             |
| 13      | NAVI voice (+)           | CAN L                   |
| 14      | -                        | Auto right              |
| 15      | SP DIF (-)               | Parking                 |
| 16      | DOOR                     | Speed                   |
| 17      | Illumination (-)         | Steering remote ground  |
| 18      | Remote antenna on        | -                       |
| 19      |                          | iPod video ground       |
| 20      |                          | AUX DETECT              |
| 21      |                          | AUX input (LH)          |
| 22      |                          | MIC- (Bluetooth)        |
| 23      |                          | Ground                  |
| 24      |                          | Ground                  |

## BE-64

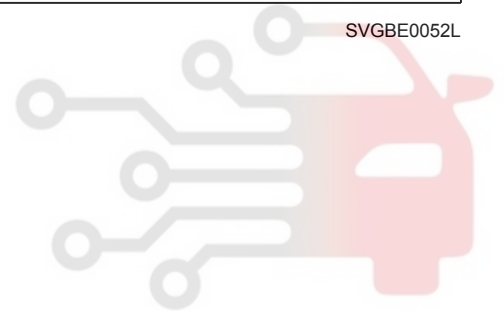
## Body Electrical System

| Radio antenna                                                                     | Pin No. | Description         | Pin No. | Description         |
|-----------------------------------------------------------------------------------|---------|---------------------|---------|---------------------|
|  | 1       | Signal              | 2       | Ground              |
| USB connector                                                                     | Pin No. | Description         | Pin No. | Description         |
|  | 1       | USB / iPod ground   | 3       | USB D (-) / iPod Tx |
|                                                                                   | 2       | USB D (+) / iPod Rx | 4       | USB / iPod VCC      |
| GPS antenna                                                                       | Pin No. | Description         | Pin No. | Description         |
|  | 1       | GPS Signal          | 2       | Ground              |

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

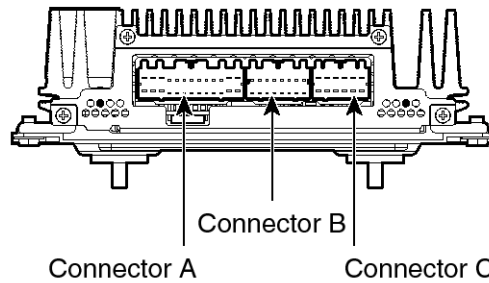
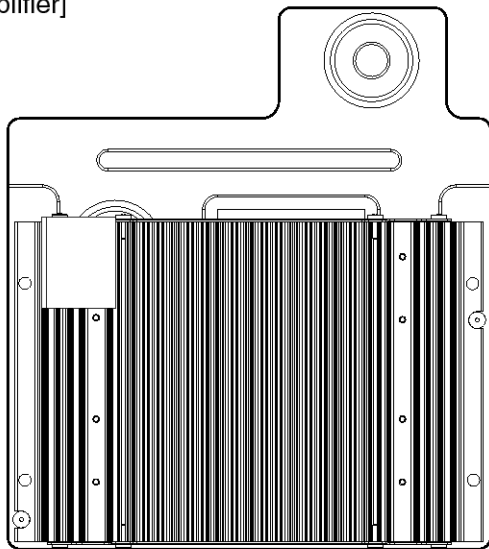
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



# AVN System

# BE-65

[External Amplifier]



| No | Connector A (26Pin) | Connector B (16Pin)       | Connector C (12Pin)      |
|----|---------------------|---------------------------|--------------------------|
|    |                     |                           |                          |
| 1  | B (+)               | Surround right (+) (12CH) | Rear door right (+)      |
| 2  | B (+)               | Surround left (+) (12CH)  | Rear door left (+)       |
| 3  | B (+)               | -                         | Front midrange right (+) |
| 4  | -                   | -                         | Front midrange left (+)  |
| 5  | CAN (+)             | -                         | Front door right (+)     |
| 6  | CAN (-)             | -                         | Front door left (+)      |
| 7  | ACC                 | Center speaker (+)        | Rear door right (-)      |
| 8  | -                   | -                         | Rear door left (-)       |
| 9  | -                   | Surround right (-) (12CH) | Front midrange right (-) |
| 10 | -                   | Surround left (-) (12CH)  | Front midrange left (-)  |
| 11 | Navigation (+)      | -                         | Front door right (-)     |
| 12 | Subwoofer 2 (+)     | -                         | Front door left (-)      |
| 13 | Subwoofer 1 (+)     | -                         |                          |
| 14 | GND                 | Center speaker (-)        |                          |
| 15 | GND                 | -                         |                          |
| 16 | GND                 | -                         |                          |
| 17 | -                   |                           |                          |
| 18 | SPDIF (+)           |                           |                          |
| 19 | SPDIF (-)           |                           |                          |
| 20 | SPDIF GND           |                           |                          |
| 21 | -                   |                           |                          |
| 22 | -                   |                           |                          |
| 23 | -                   |                           |                          |
| 24 | Navigation (-)      |                           |                          |
| 25 | Subwoofer 2 (-)     |                           |                          |
| 26 | Subwoofer 1 (-)     |                           |                          |

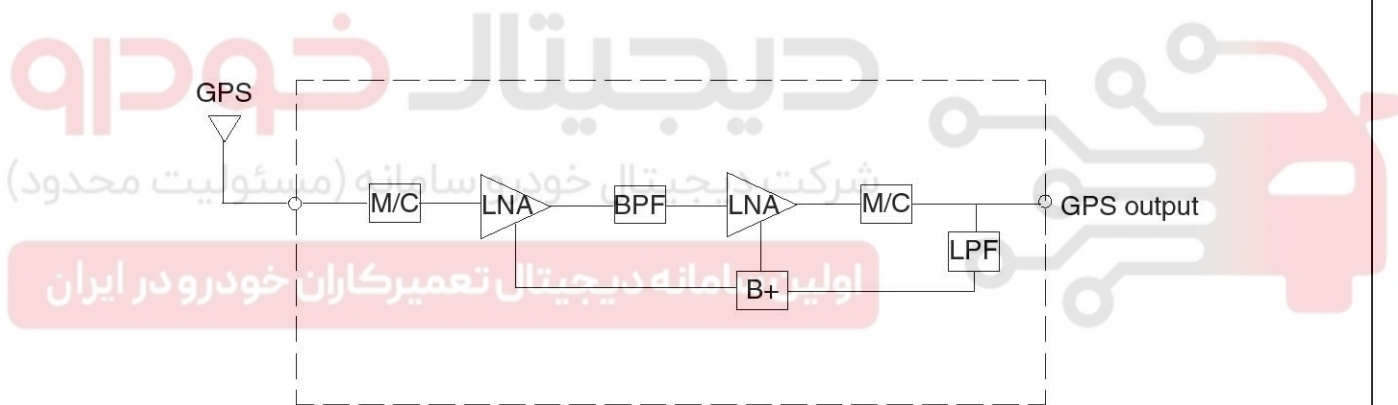
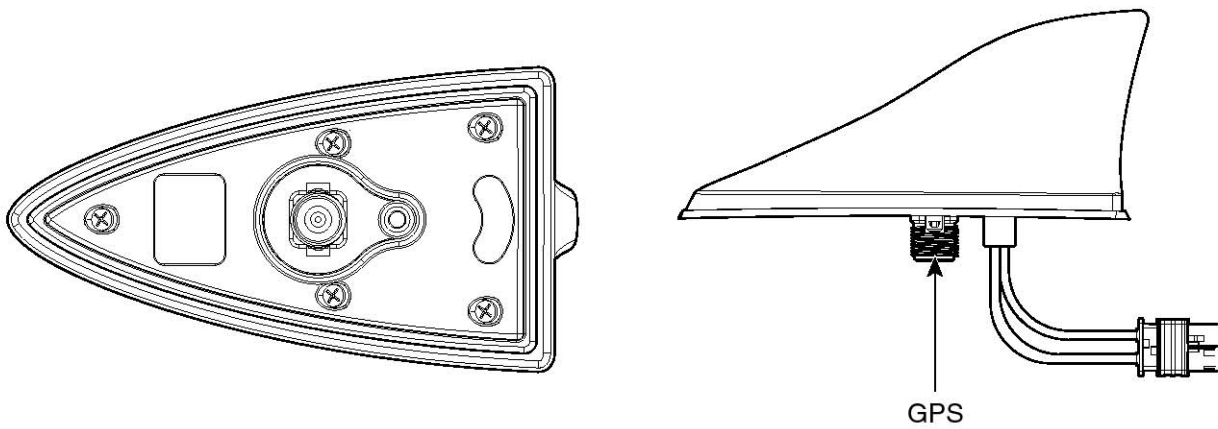
SVGBE0053L

# BE-66

# Body Electrical System

[Roof Antenna (GPS)]

[GPS]



SVGBE0054L

# AVN System

# BE-67

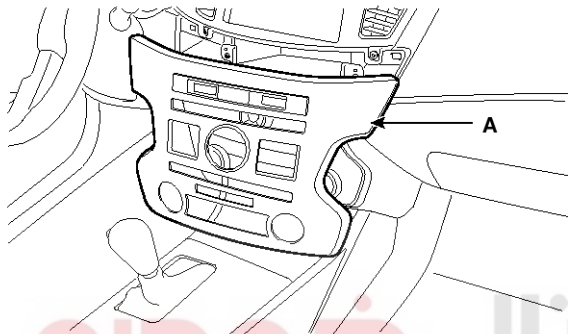
## Removal

### AVN Head Unit

#### NOTICE

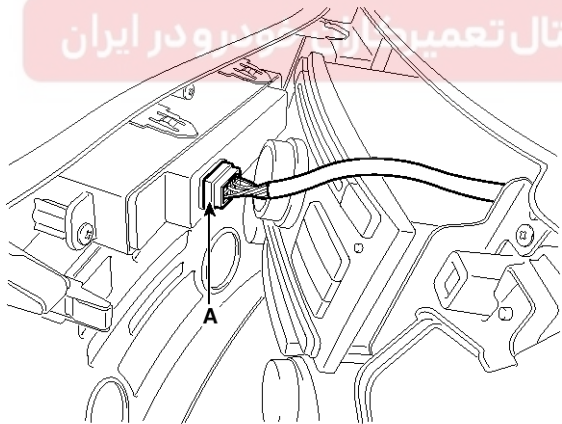
- Take care not to scratch the center fascia panel and related parts.
- Eject all the disc before removing the AVN head unit to prevent damaging the CD player's load mechanism.

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad center fascia panel (A).



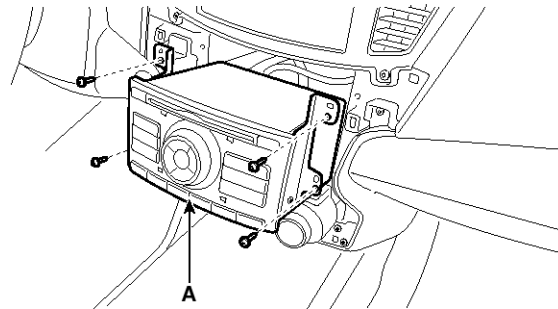
SVGBE0008D

3. Disconnect the center fascia panel connector (A).



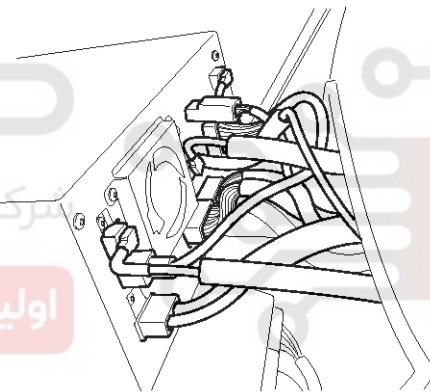
SVGBE0009D

4. Remove the AVN head unit (A) after loosening the mounting screws.



SVGBE0010D

5. Remove the AVN head unit connectors and cables (A).



SVGBE0011D

#### NOTICE

- If CD does not eject, don't try to remove it.
- The player may be damaged.
- Therefore, contact a service shop for repairs.

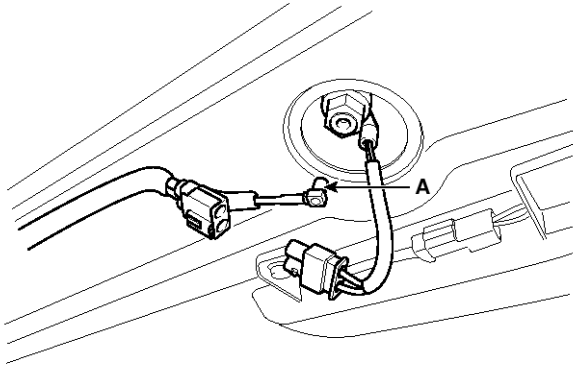


## BE-68

## Body Electrical System

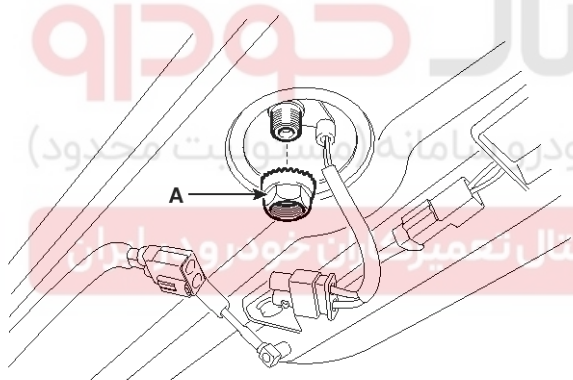
### Roof Antenna (GPS)

1. Remove the rear roof trim.  
(Refer to the BD group - "Roof trim")
2. Disconnect the GPS (A) cable from the roof antenna.



SVGBE0059L

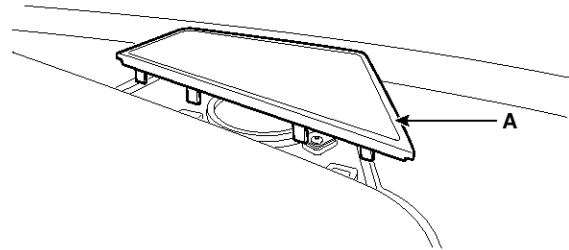
3. Remove the roof antenna after removing a nut (A).



SVGBE0061D

### Center Speaker

1. Remove the crash pad center speaker grill (A).

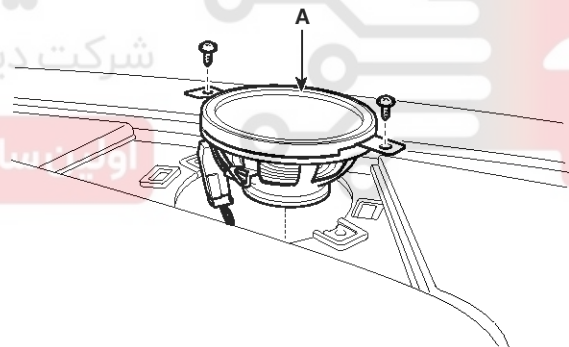


SVGBE0026D

#### **NOTICE**

Take care not to damage and scratch the center speaker grill and its related parts.

2. Remove the center speaker (A) after loosening the mousing screws (2EA).



SVGBE0027D

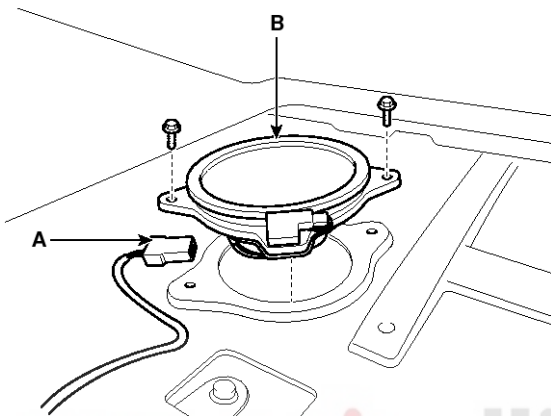
3. Disconnect the center speaker connector.  
※ Except center speaker, refer to the audio system.

# AVN System

# BE-69

## Rear Surround Speaker

1. Remove the rear seat.  
(Refer to the BD group - "Rear seat")
2. Remove the rear package tray.  
(Refer to the BD group - "Package tray")
3. Disconnect the rear surround speaker connector (A).
4. Remove the rear surround speaker (B) after removing 2 bolts.



SVGBE0062D

## Installation

### AVN Head Unit

1. Connect the AVN head unit connectors and cable.
2. Install the AVN head unit.
3. Install the center fascia panel.
4. Connet the battery (-) terminal.

#### **NOTICE**

*Make sure the AVN Head unit connectors are plugged in properly and the antenna cable is connected properly.*

### Roof Antenna (GPS)

1. Installation the roof antenna.
2. Connect the GPS cable.
3. Install the rear roof trim.

#### **NOTICE**

- *Make sure that the cables and connectors are plugged in properly.*
- *Check the AVN system.*

### Center Speaker

1. Connect the center speaker connector.
2. Installation the center speaker.
3. Installation the crash pad center speaker grill.

#### **NOTICE**

- *Make sure that the cables and connectors are plugged in properly.*
- *Check the AVN system.*

### Rear Surround Speaker

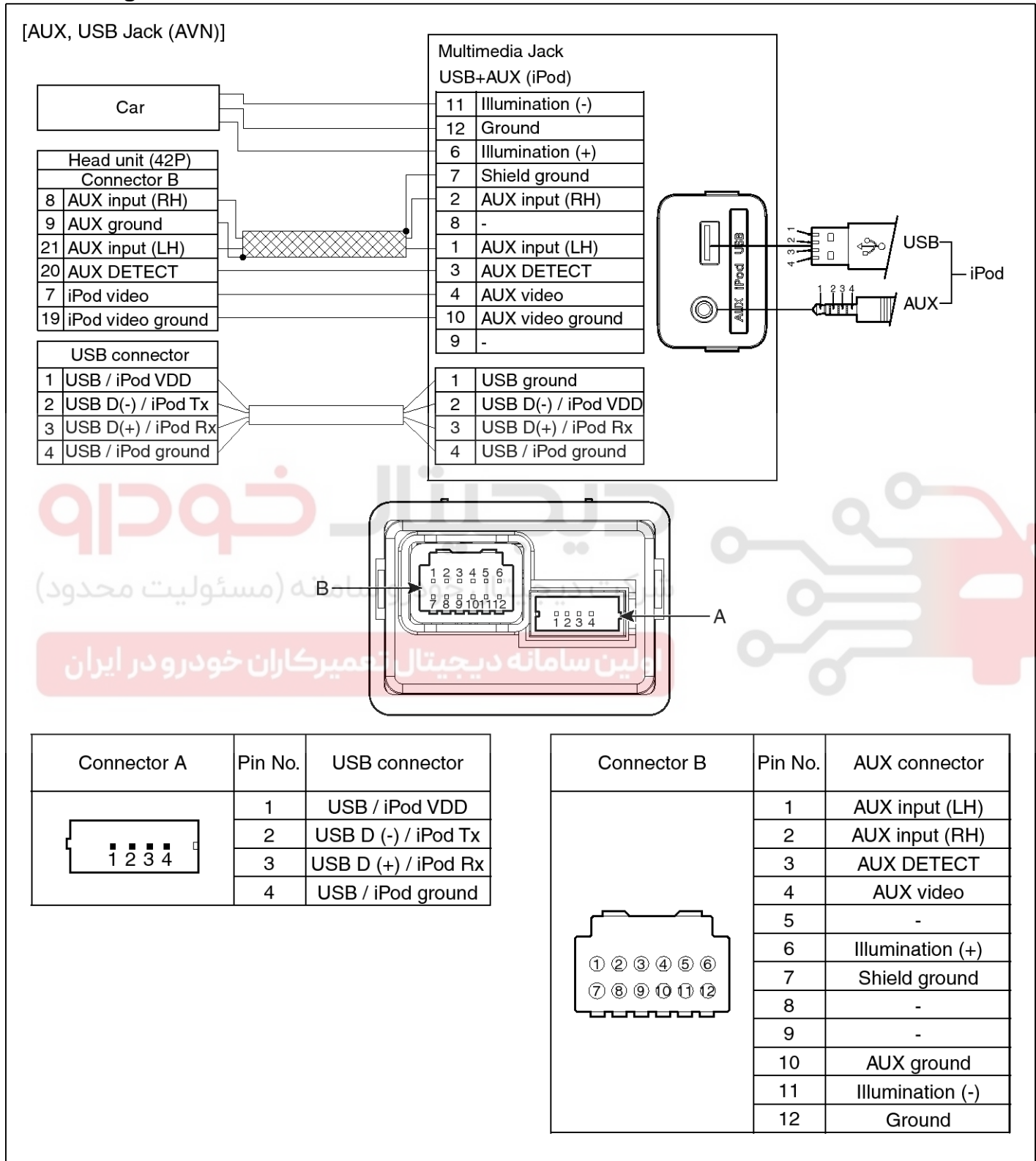
1. Install the rear surround speaker.
2. Connecting the connector.
3. Install the rear package tray.
4. Inatall the rear seat.

# BE-70

# Body Electrical System

## Multimedia Jack

### Circuit Diagram



| Connector A | Pin No. | USB connector       |
|-------------|---------|---------------------|
|             | 1       | USB / iPod VDD      |
|             | 2       | USB D (-) / iPod Tx |
|             | 3       | USB D (+) / iPod Rx |
|             | 4       | USB / iPod ground   |

| Connector B | Pin No. | AUX connector    |
|-------------|---------|------------------|
|             | 1       | AUX input (LH)   |
|             | 2       | AUX input (RH)   |
|             | 3       | AUX DETECT       |
|             | 4       | AUX video        |
|             | 5       | -                |
|             | 6       | Illumination (+) |
|             | 7       | Shield ground    |
|             | 8       | -                |
|             | 9       | -                |
|             | 10      | AUX ground       |
|             | 11      | Illumination (-) |
|             | 12      | Ground           |

SVGBE0055L

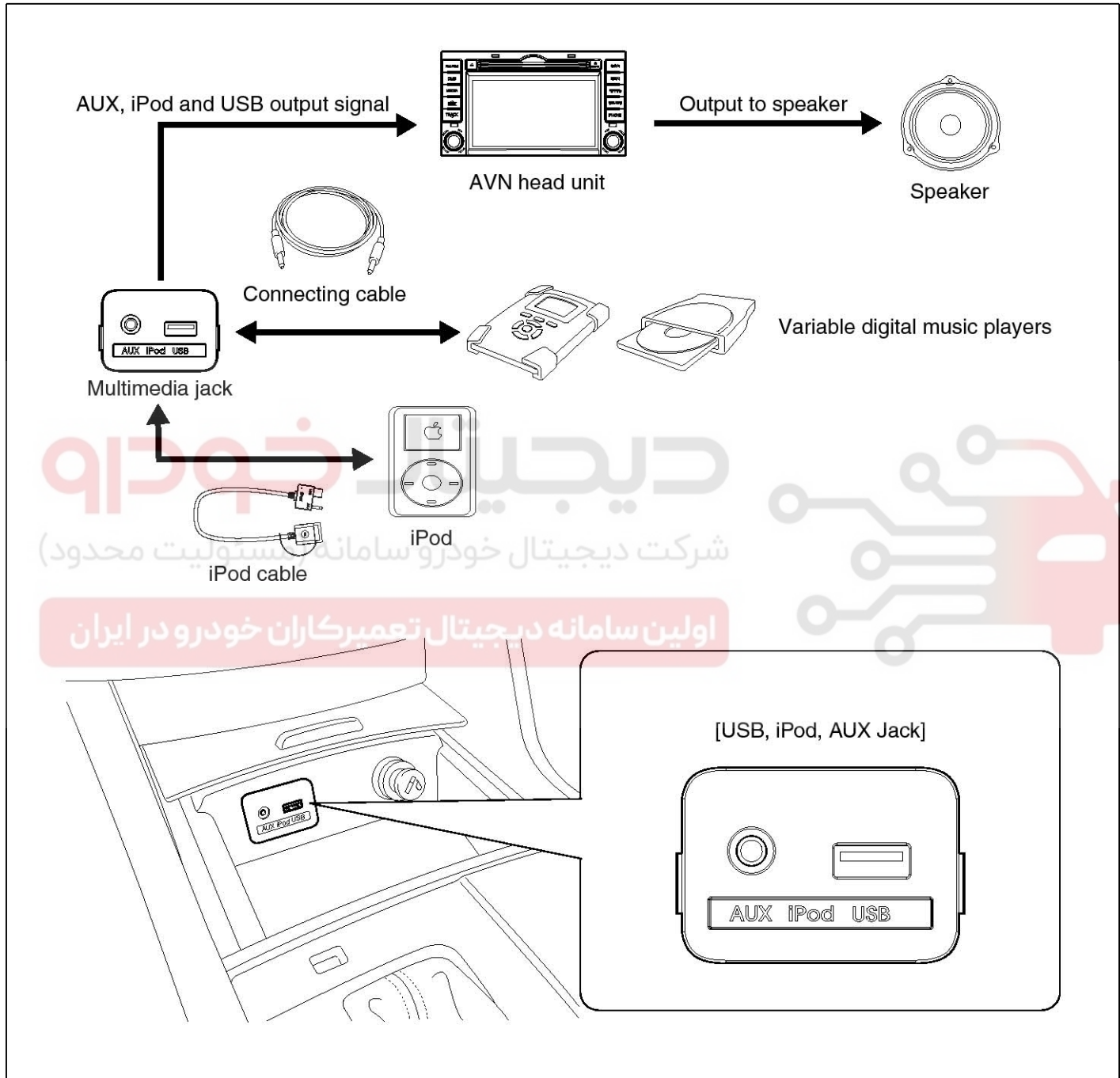
# AVN System

# BE-71

## Description

The multimedia jack on the console upper cover is for customers who like to listen to external portable music players like the MP3, iPod and etc., through the vehicle's sound system when it is linked to this jack. The customer has this added option.

In case of distortions from media connected to the AUX source, the audio unit may not be defective but the output level of the used media does not match the specification of the AUX input.



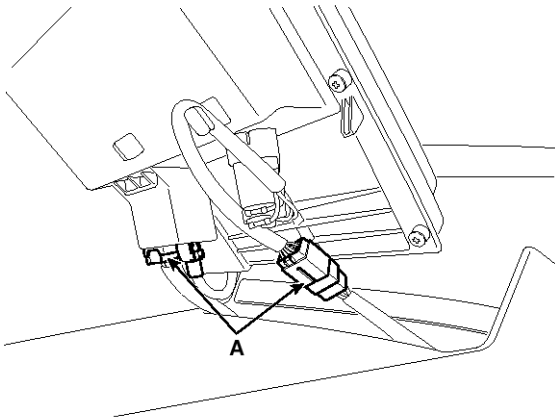
SVGBE0056L

## BE-72

## Body Electrical System

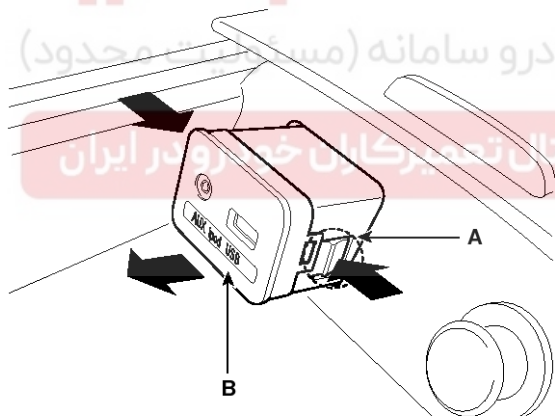
## Removal

1. Remove the shift lever knob.  
(Refer to the BD group - "Console")
2. Remove the floor console upper cover.
3. Disconnect the connector (A) from the floor console upper cover.



SVGBE0037D

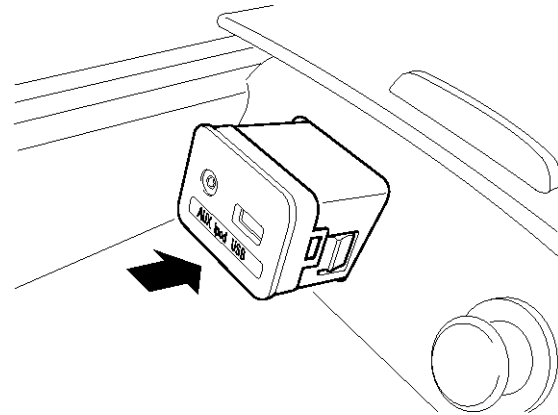
4. Remove the multimedia jack (B) from the console upper cover after releasing the fixed hooks (A).



SVGBE0038D

## Installation

1. Install the multimedia jack.



SVGB10080D

2. Install the floor console upper cover.
3. Install the shift lever knob.

**NOTICE**

*Make sure the multimedia connector and the console upper cover connectors are plugged in properly.*

# Smart key System

BE-73

## Smart key System

### Specification

#### Smart Key Unit

| Items                 | Specification                |
|-----------------------|------------------------------|
| Rated voltage         | DC 12V                       |
| Operating voltage     | DC 9 ~ 16V                   |
| Operating temperature | -30°C ~ 75°C (-22°F ~ 167°F) |
| Load                  | Max. 2mA                     |

#### RF Receiver

| Items        | Specification                |
|--------------|------------------------------|
| Frequency    | 433.92 MHz                   |
| Antenna type | FSK (Frequency Shift Keying) |

#### Smart Key FOB

| Items         | Specification                                                                                                                                                                                                                        |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Battery       | Lithium battery 3V 1EA                                                                                                                                                                                                               |
| Distance      | 30m from vehicle, RF : 30m, Passive(LF) : 0.7m                                                                                                                                                                                       |
| Battery life  | More than 2years (10 times / a day)<br><b>⊗WARNING</b><br><b>An inappropriately disposed battery can be harmful to the environment and human health.</b><br><b>Dispose the battery according to your local law(s) or regulation.</b> |
| Push buttons  | 4 (Door lock / unlock, Trunk lid open, Panic)                                                                                                                                                                                        |
| Frequency(Rx) | 125 kHz                                                                                                                                                                                                                              |
| Frequency(Tx) | 433.92 MHz                                                                                                                                                                                                                           |
| Numbers       | 2EA                                                                                                                                                                                                                                  |

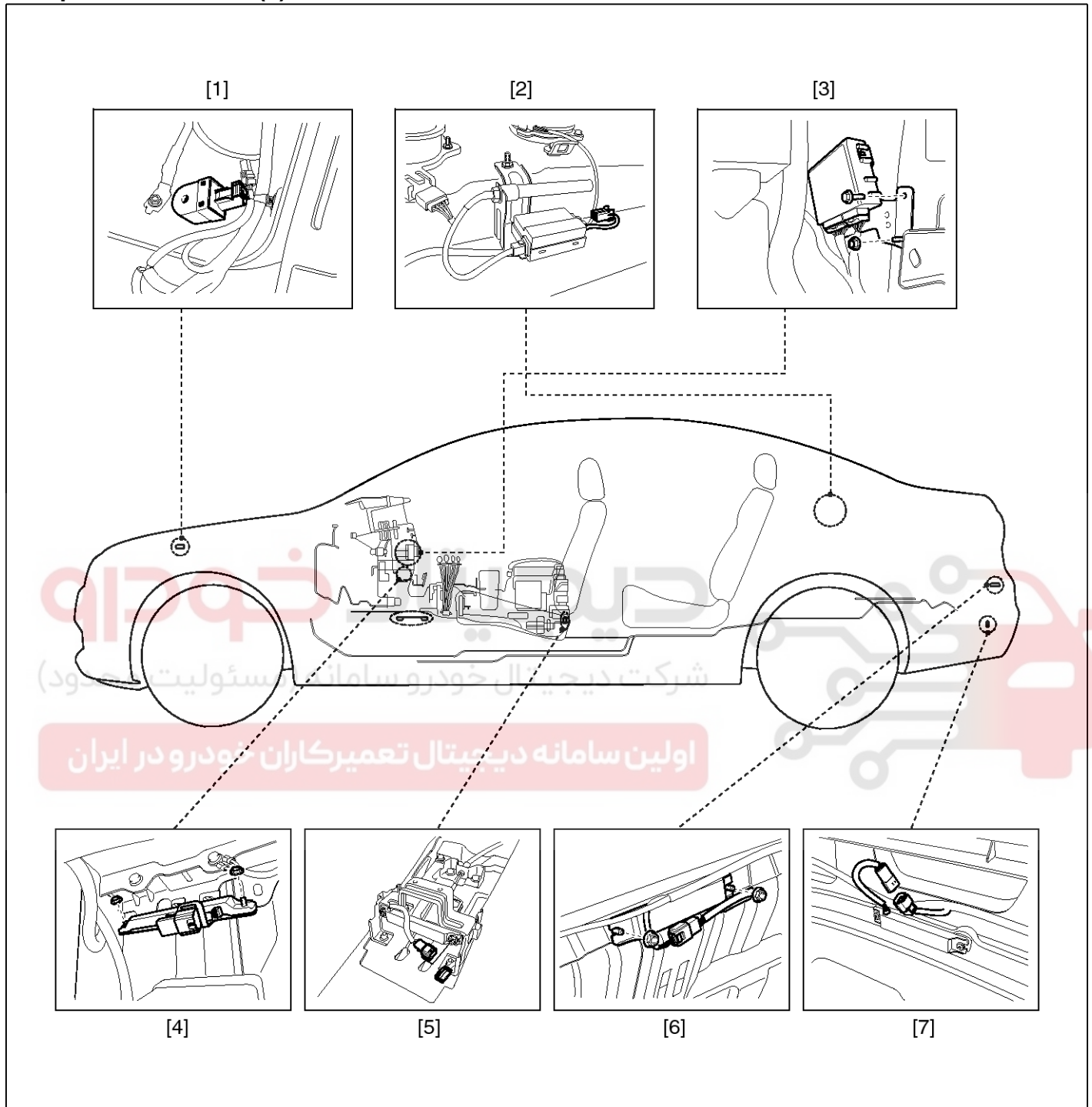
#### Antenna

| Items                 | Specification                         |
|-----------------------|---------------------------------------|
| Rated voltage         | DC 12V                                |
| Operating voltage     | DC 9 ~ 16V                            |
| Operating temperature | -30°C ~ 75°C (-22°F ~ 167°F)          |
| Frequency             | 125kHz                                |
| Numbers               | Interior(3EA), Door(2EA), Bumper(1EA) |

# BE-74

# Body Electrical System

## Component Location (1)



SVGBE0076D

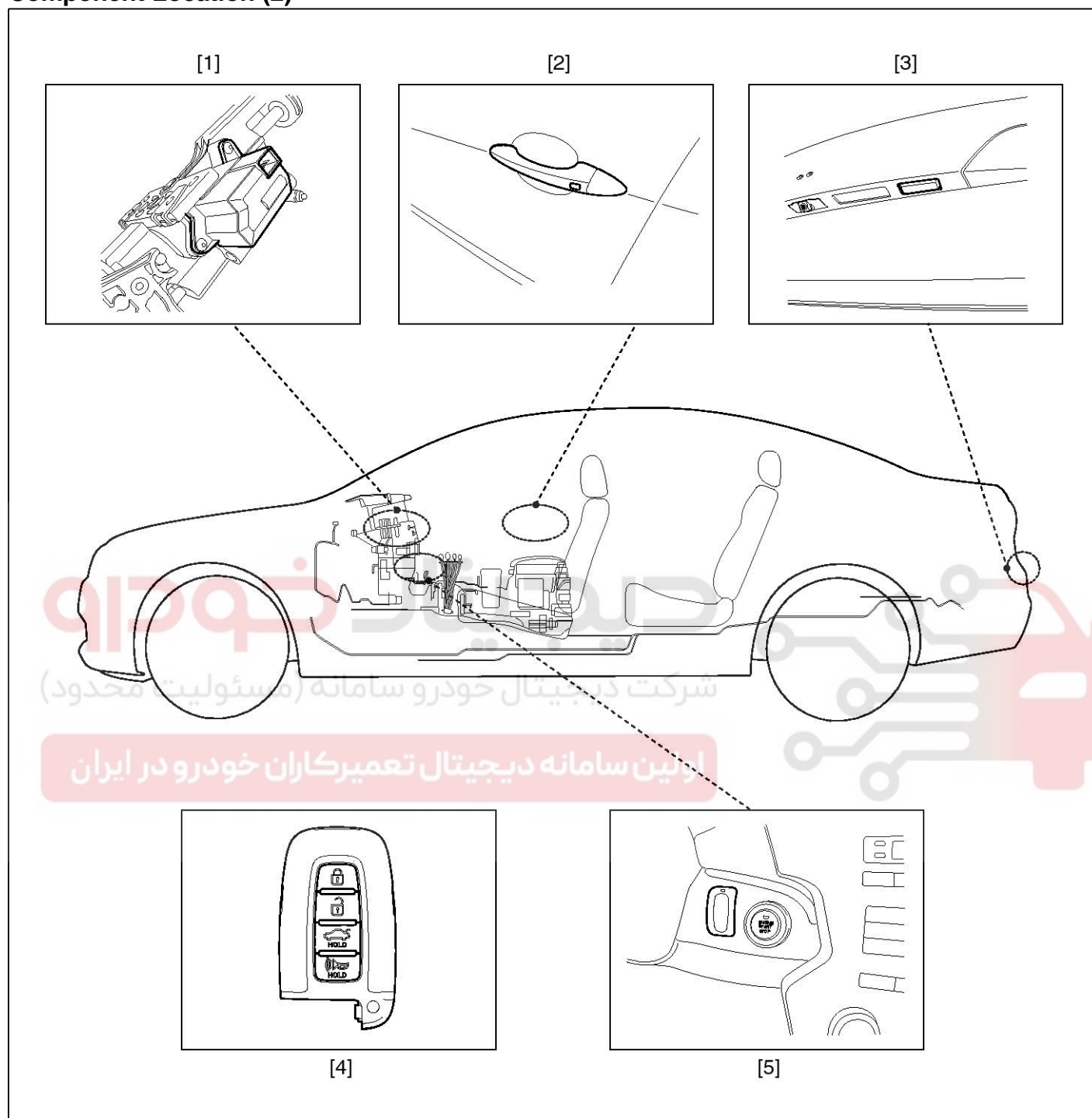
- |                       |                       |
|-----------------------|-----------------------|
| 1. Buzzer             | 5. Interior antenna 2 |
| 2. RF receiver        | 6. Trunk antenna      |
| 3. Smart key unit     | 7. Bumper antenna     |
| 4. Interior antenna 1 |                       |



# Smart key System

# BE-75

## Component Location (2)



SVGBE0077D

- 1. Electronic Steering Column Lock (ESCL)
- 2. Door outside handle & Button
- 3. Trunk lid open switch

- 4. FOB key
- 5. FOB holder

## BE-76

## Body Electrical System

### Description

The SMART KEY system is a system that allows the user to access and operate a vehicle in a very convenient way. To access the vehicle, no traditional key or remote control unit is needed.

The user carries a SMART KEY FOB which does not require any conscious actions by the user (e.g. operate a RKE button). The SMART KEY system is triggered by pressing a push button in the door handle.

After being triggered the vehicle sends out a request in a limited range. If the SMART KEY FOB receives this request, it automatically sends a response to the vehicle. Then the system decides whether to perform a particular action (unlocking, locking...) or remain inactive.

In a similar manner the vehicle's Electrical Steering Column Lock (ESCL) is released. Again, a communication between the vehicle and the SMART KEY FOB is needed before any actions will be performed.

The System offers the following features :

- Passive unlock via door driver side and passenger side
- Passive locking via door driver side and passenger side
- Passive start
- Passive access trunk via the trunk lid switch at the trunk
- Passive locking via tailgate
- Max. 2 fobs can be handled by the system
- Immobilizer backup antenna driver integrated into FOB-HOLDER for TP authentication (i.e. limp home mode)
- Communication with engine management system
- Communication with SRX
- LF-RF communication

#### 1. Passive unlock

The system allows the user to access (unlock) the vehicle without performing any actions with the SMART KEY FOB. This feature could be different depending on platform as follows:

- Pressing Push button in door handle

#### 2. Passive locking

The system allows the user to lock the vehicle by pushing a button on door handle with the SMART KEY FOB.

#### 3. Button start

The system allows the user to release ESCL and to switch the power modes (Off, Accessory, Ignition), as well as to start and stop the vehicle's engine without performing any actions with the SMART KEY FOB. See Button Engine Start system specification.

#### 4. LIMP HOME Mode

Additionally, the system offers so called "limp home mode", which is the user can operate all vehicle functions by inserting the key into the FOB HOLDER.

### Smart Key ECU (SMK ECU)

The SMK ECU manages all functions related to "Passive Unlock", "Passive Lock" and "Passive Authorization for Engine Start Operation".

It reads the inputs (Push button in door handle, Start Stop Button (SSB), PARK position Switch), controls the outputs (e.g. exterior and interior antennas), and communicates via the CAN/LIN (depends on the vehicle) as well as a single line interface to further devices of the car.

It reads the inputs (Push button in door handle, Start Stop Button (SSB), PARK position Switch), controls the outputs (e.g. exterior and interior antennas), and communicates via the CAN as well as a single line interface to further devices of the car.

For communication with the SMART KEY FOB, SMK ECU generates a request (challenge) as an encoded and modulated 125 kHz signal at the inductive antenna outputs and receives the SMART KEY FOB's response via the external RF receiver.

The main functional blocks of the SMK ECU are:

- Power supply
- Microcontroller with FLASH Memory
- Single Line Interface to SRX
- Single Line Interface to EMS
- Input stage
- LF antenna amplifier/driver
- CAN communication with DDM
- LIN communication with other unit (depending on platform)

The LF antenna amplifier/driver generates a 125 kHz sinusoidal carrier signal which is distributed to the different antennas.

# Smart key System

# BE-77

## Smart Key FOB

The system supports up to 2 SMART KEY FOBs.

The main functions of the SMART KEY FOB are:

- Passive functionality: receives LF-challenge and sends automatically RF response.
- Classic RKE function by action up to 6 push buttons.
- Transponder-functionality in case of a flat battery or a disturbed communication.
- LED for operation feedback and battery monitoring.

### NOTICE

*The FOB's LED indicator may continue to light even with a low transmitter battery.*

*If the performance or range of the FOB is less than expected, check the transmitter battery.*

## Antennas

### 1. Emitting LF Antennas:

Inductive antennas in and at the vehicle are used to transform the current, driven by the SMK ECU antenna driver, into a 125 kHz magnetic field, which is the carrier for the SMART KEY challenge.

Three antennas cover the vehicle's exterior: two antennas in the Door Handles (DS and PS) cover the area around the doors; one antenna in the rear bumper covers the area around the trunk.

Two antennas cover the vehicle's exterior: two antennas in the Door Handles (DS and PS) cover the area around the doors.

Up to three antennas cover the vehicle's interior and the trunk interior: two in the passenger compartment and one in the trunk.

### 2. Bidirectional Immobilizer Antenna (for Limp Home):

The Immobilizer Backup Antenna is used for sending and receiving data: it emits a magnetic field (125 - 135 kHz challenge) and receives changes in the field strength (response of Transponder).

### 3. External Receiver

The SMART KEY FOB's response is received via the external RF receiver, which is connected to the SMK ECU via a serial communication Line.

The SMK ECU provides a connector pin for the serial communication Line.

## Door Handle

The front door handles of the two doors (driver door / passenger door) are equipped with emitting LF-antennas to emit the 125 kHz signals. The front door handles are also equipped with a push button.

### Push Button

The push button in door handle serves as a trigger to indicate the user's intent to unlock or lock the vehicle.

The push buttons are installed at front doors, integrated into the door handles.

Another button is installed at the trunk lid.

## Operation

### Passive Functions

The system allows the user to access the vehicle without having to perform any actions (e.g. RKE button pressing) with the SMART KEY FOB. It is sufficient that a valid SMART KEY FOB is located within a defined and limited range with respect to the vehicle. So the system is capable of detecting and authenticating a SMART KEY FOB in the ranges as specified below.

### Operating Range

The SMART KEY FOB receives and interprets a challenge sent from the vehicle via the exterior antennas in a free space range of min. 0.7m measured around the exterior antennas which are integrated in the door handles; refer to the below given picture. The trunk access range is also min. 0.7m measured from the antenna position.

The SMART KEY FOB receives and interprets a challenge sent from the vehicle via the exterior antennas in a free space range of min. 0.7m measured around the exterior antennas which are integrated in the door handles; refer to the below given picture

### Passive Access (Passive Entry)

Pressing one of the push buttons in the door handles when all doors locked indicates the operator's intent to access the vehicle and thus triggers the system for unlock

### Passive Locking (Exit)

Pressing one of the push buttons in the door handles when one of the following condition is fulfilled:

- At least one door is unlocked and two\_steps timer is not running or
- Two\_steps timer is running and one of the push button except Front Left side is triggered

indicates the operator's intent to lock the vehicle and thus triggers the system for a lock.

## BE-78

## Body Electrical System

### Passive Open Tailgate

Pressing the Trunk Lid Switch when trunk is closed indicates the operator's intent to open the trunk and thus triggers the system. Subsequently, the SMK ECU sends a LF-challenge to the SMART KEY FOB via the exterior bumper antenna. The SMART KEY FOB answers with a RF-response. If the received response matches the expected answer, SMK ECU sends a "trunk open" message via the CAN network.

### Passive Trunk Warning

Whenever the trunk is closed, SMK ECU uses a suitable search strategy to avoid trunk buzzer warning by a fob outside the vehicle. Then SMK searches for a SMART KEY FOB in the interior of the trunk. If a valid SMART KEY FOB is found in the trunk, the SMK ECU activates SMK external buzzer (TBD) to inform the user that the trunk has been closed with a fob inside the trunk.

SMK will send the trunk open command to BCM for trunk reopening if Trunk reopening bit is set for this functionality, a "valid" SMART KEY FOB means any SMART KEY FOB that belongs to the vehicle, even if it's DEACTIVATED.

### NOTICE

- A blind spot in the trunk similar to any RF disturbance may lead to no trunk warning. Due to the penetration of the bumper antenna into the trunk area the lid may open without an Identification Device outside.
- A blind spot in the trunk similar to any RF disturbance may lead to no trunk warning

### Smart Key Reminder 1

1. Preconditions:
  - All terminals OFF & at least one door open & locking status is not locked checked by SMK periodically every 100ms, as long as CAN/LIN active.
2. Event:
  - At least 1 door knob status changed from unlock to lock.

### 3. SMK actions:

- IF NO FOB-IN ACTIVE

SMK performs a search for the fobs in the interior of the vehicle. The same LF-strategy has to be used as it is defined for the ID out warning (registering only, no authentication)

- IF FOB-IN ACTIVE

SMK sends request toward PDM to search valid TP

If no fob or no TP has been found, no action is required.

If any valid fob or valid TP has been found, SMK unlocks the vehicle by sending a CAN Key Reminder unlock message with the fob number.

If any valid fob has been found, SMK unlocks the vehicle by sending a CAN/LIN Key Reminder unlock message with the fob number.

### Smart Key Reminder 2

#### 1. Preconditions:

All terminals OFF & any door (including trunk) open & no FOB-IN & no locking status (checked by SMK periodically every 100ms, as long as CAN/LIN active)

#### 2. Vehicle action:

Closing last door or trunk with knobs locked state, or with a locking in progress

#### 3. SMK actions:

Before elapsing 500ms after the closing if all doors are locked then:

- IF NO FOB-IN ACTIVE

SMK performs a search for the fobs in the interior of the vehicle.

The same LF-strategy has to be used as it is defined for the ID out warning (registering only, no authentication)

- IF FOB-IN ACTIVE

SMK sends request toward PDM to search valid TP

If no fob has been found, no action is required.

If any valid fob or valid TP has been found, SMK sends unlock command via CAN and activates ext. buzzer warning.

If any valid fob has been found, SMK sends unlock command via CAN/LIN and activates ext. buzzer warning.



# Smart key System

# BE-79

## Smart Key Door Lock Warning

### Door Lock Warning 1

#### 1. Preconditions:

While (at least one door knob is unlocked) & (ACC ON or IGN ON) & (No FOB-IN) :

- (All doors are closed) & (trunk closed)

#### 2. Event:

- User presses the push button in door handle or trunk

#### 3. SMK actions:

SMK performs a search for the fobs outside of the vehicle; the same LF-strategy has to be used as it is defined for "Scenario Access with I/O Distinction".

### Door Lock Warning 2

#### 1. Preconditions:

Same as passive locking precondition but with at least one door open.

#### 2. Event:

User presses the door handle Push button .

#### 3. SMK actions:

SMK performs a search for the fobs outside of the vehicle; the same LF-strategy has to be used as it is defined for "Scenario Access with I/O Distinction".

If no fob has been found, no action is required.

If the preconditions are no longer valid during buzzer active time (3 seconds), the SMK ECU stops the buzzer immediately.

### Door Lock Warning 3

#### 1. Preconditions:

Same as passive locking precondition

#### 2. User action:

- User presses the door handle Push button

#### 3. SMK ECU actions:

- If ATWS(Anti Theft Warning System) is in DISARM status, SMK ECU performs a search for the fob inside of the vehicle (use "Door Lock Warning 3" scenario)

If no fob has been found, the passive locking is performed.

If any valid fob has been found, SMK ECU activates the external buzzer.

If the activity timer elapsed or ACC ON or IGN1 ON or NOT All door closed or FOB-IN, the SMK ECU stops the buzzer immediately.

After searching of inside fob, SMK ECU also performs a search for fobs outside of the vehicle.

## Smart Key Lamp Warning

### 1. SMK actions:

As long as the preconditions are valid, the SMK ECU performs a periodical search for the fobs in the interior of the vehicle; the same LF-strategy has to be used as it is defined for the ID out warning (registering only, no authentication); periodical means, the search is done every 3 seconds.

If no fob has been found, the SMK ECU starts Key out indicator lamp activation as all preconditions are valid and will perform another search 3 seconds later.

If any valid fob has been found, the SMK ECU stops the Key out indicator lamp and will (if one door is open) perform another search 3 seconds later; if no door is open then it's only at the next When the preconditions are still valid, the search resumes by opening of one door.

## Failsafe Functions (Backup For Limp Home)

In case of a discharged battery of the SMART KEY FOB or disturbed transmission, the following functions are available:

- Unlocking / locking of doors or trunk (or tailgate depending of the vehicle configuration): use of mechanical key

## User Information Functions

### ID OUT Warning

#### 1. Preconditions:

- (ACC or IGN1) & (any door open or trunk open)

#### 2. Event:

The last opened door is closed

#### 3. SMK action:

SMK searches for a SMART KEY FOB in the interior.

- If no valid SMART KEY FOB is found, the SMK activates external buzzer and also sends ID OUT warning via CAN (exterior buzzer warning and internal buzzer warning).
- If a door is opened and closed again during terminals on and inside valid fob, SMK re-enables the authentication and stops the warning. If the terminal is in ACC, SMK shall turn on immobilizer lamp.

## NOTICE

*If there is a LF error (LF overheating or LF antenna failure), the system will have the same behavior as it is with no fob found.*

# BE-80

# Body Electrical System

## Immobilizer Lamp

Removing the PIF from the MSL and reinserting the PIF and pushing the MSL Knob will switch the lamp on again.

## Fob Battery Low Voltage Detection

To detect fob low battery condition, certain battery voltage measurement and low voltage detection strategy are implemented into fob. The measurement of the battery voltage will be done if fob button is pressed or if a LF measurement command is received.

If the fob has detected a low battery voltage, the LED will not be switched on at button press.

## Learning Description

In this chapter, the learning procedure for SMK, PDM, ESCL and FOBs is described.

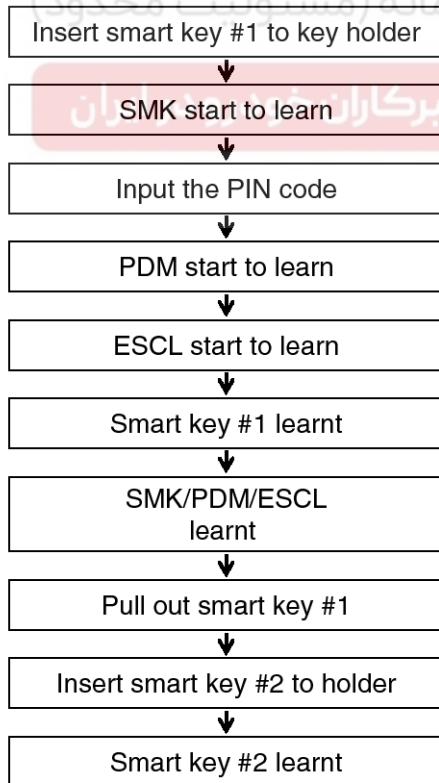
For the learning of the SMK, PDM, ESCL and FOBs, it's necessary to have a connection to the diagnostic tool.

## Learning MODE

Whatever the mode, the learning procedures are managed by the SMK.

Prior to start learning service, Fob-In signal must be active and the vehicle secret code (called as PIN code) should be known.

### Smart key teaching



- Smart key system is learnt **transponder and smart key** by once at same time.

### <Smart key neutralization mode>

- Neutralization mode is for replacing Smart key unit, ESCL, PDM ECM easily.
- It is possible that smart key is learnt again, after neutralizing Smart key system.
- Virgin start (twice ignition) is impossible in neutralized condition

### <Lock by timer>

- If PIN code is inputted over 3 times, it is impossible to learnt and neutralization during 1 hour.

## Teaching MODE

This mode is used by the dealers in order to replace SMK and/or PDM and/or ESCL and/or the set of keys, or to register additional keys for an existing system. That means the system already has been learnt with certain PIN Code. The PIN Code is fixed for the life time of the vehicle, therefore the same PIN Code must be used in this mode. Otherwise learning will be failed

## Teaching MODE Procedure Description (Step By Step)

Objective: Key teaching procedure at service station

Initial state:

- SMK replacement: SMK is not learnt, PDM and ESCL and SMART FOB are already learnt with same PIN code
- PDM replacement: PDM is not learnt, SMK and ESCL and SMART FOB are already learnt with same PIN code
- ESCL replacement: ESCL is not learnt, SMK and PDM and SMART FOB are already learnt with same PIN code
- Additional or new keys teaching: SMK and PDM and ESCL are already learnt with same PIN code

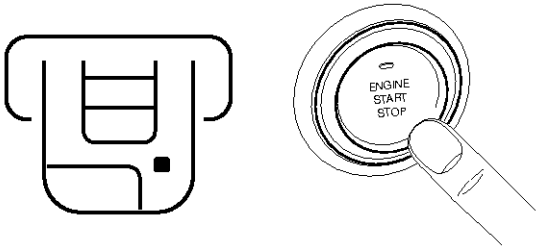
# Smart key System

## BE-81

### Starting After Replacing (Virgin Start)

Starting is possible by following process after replacing new smart key unit , PDM, FOB key or ESCL.

- It is for starting at virgin condition
- All related parts are virgin condition (Smart key, DDM, PDM, ESCL ECM)
- ESCL is always unlock at virgin
- When virgin smart key is inserted in smart key holder, possible to start, IG ON and ACC position



SVIBE9140D

- Press brake pedal in P or N range
- After inserting virgin smart key to holder, push start button once.



اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

SHMBE9016L





**BE-82****Body Electrical System****Inspection****Self Diagnosis With GDS**

Smart key system defects can be quickly diagnosed with the GDS. GDS operates actuator quickly to monitor, input/output value and self diagnosis.

The following three features will be major problem in SMART KEY system.

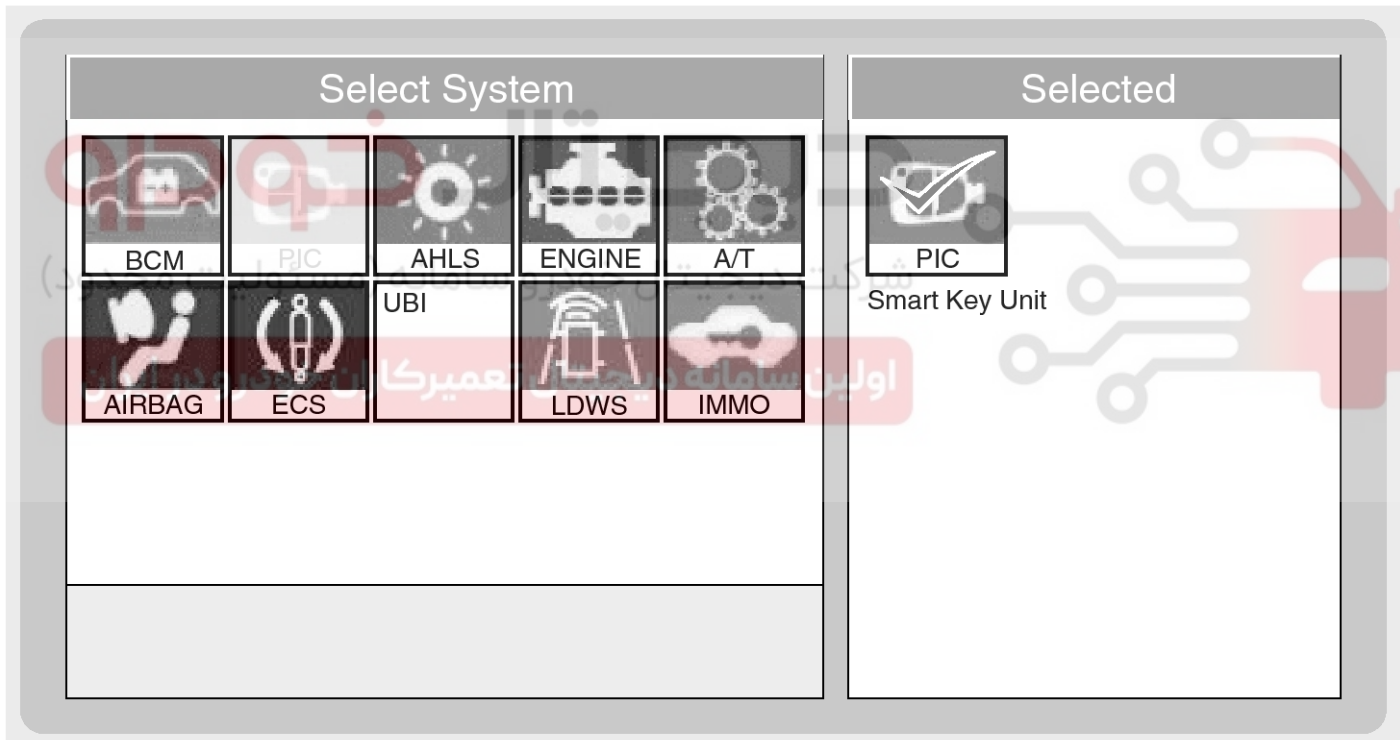
1. Problem in SMART KEY unit input.
2. Problem in SMART KEY unit.
3. Problem in SMART KEY unit output.

The following three diagnostic solutions will be the main solution process to a majority of concerns.

1. SMART KEY unit Input problem : switch diagnosis
2. SMART KEY unit problem : communication diagnosis
3. SMART KEY unit Output problem : antenna and switch output diagnosis

**Switch Diagnosis**

1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel, turn the power on GDS.
2. Select the vehicle model and then SMART KEY system.



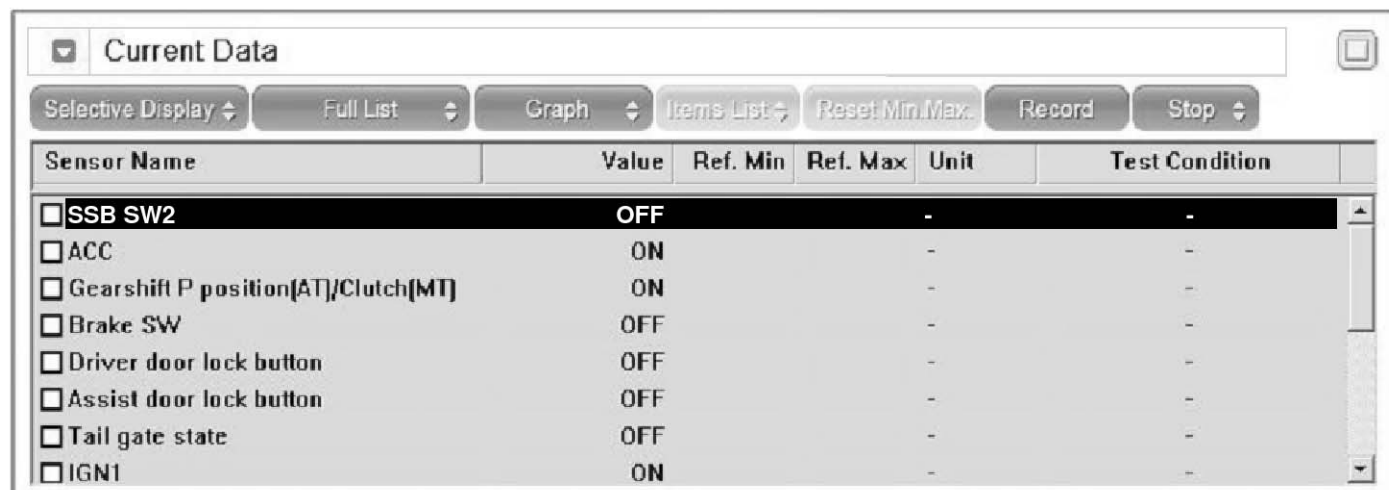
SVGBE0230L

# Smart key System

## BE-83

3. Select the "SMART KEY unit".

4. After IG ON, select the "Current data".



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5. You can see the situation of each switch on scanner after connecting the "current data" process.

| Display          | Description                                       |
|------------------|---------------------------------------------------|
| FL Toggle switch | ON : Push button is ON in the driver door handle. |
| FR Toggle switch | ON : Push button is ON in the assist door handle. |
| Trunk switch     | ON : Trunk button is ON.                          |
| Gear P Position  | ON : Shift lever is P position.                   |
| IGN 1            | ON : IGN switch is IG position.                   |
| ACC              | ON : IGN switch is ACC position.                  |
| Push Knob switch | ON : Push knob switch is ON.                      |
| External Buzzer  | ON : Buzzer is ON.                                |

# BE-84

# Body Electrical System

## Communication Diagnosis With GDS (Self Diagnosis)

1. Communication diagnosis checks that the each linked components operates normal.

2. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.
3. After IG ON, select the "DTC".



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## Antenna Actuation Diagnosis

1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.

2. After IG ON, select the "ACTUATION TEST".

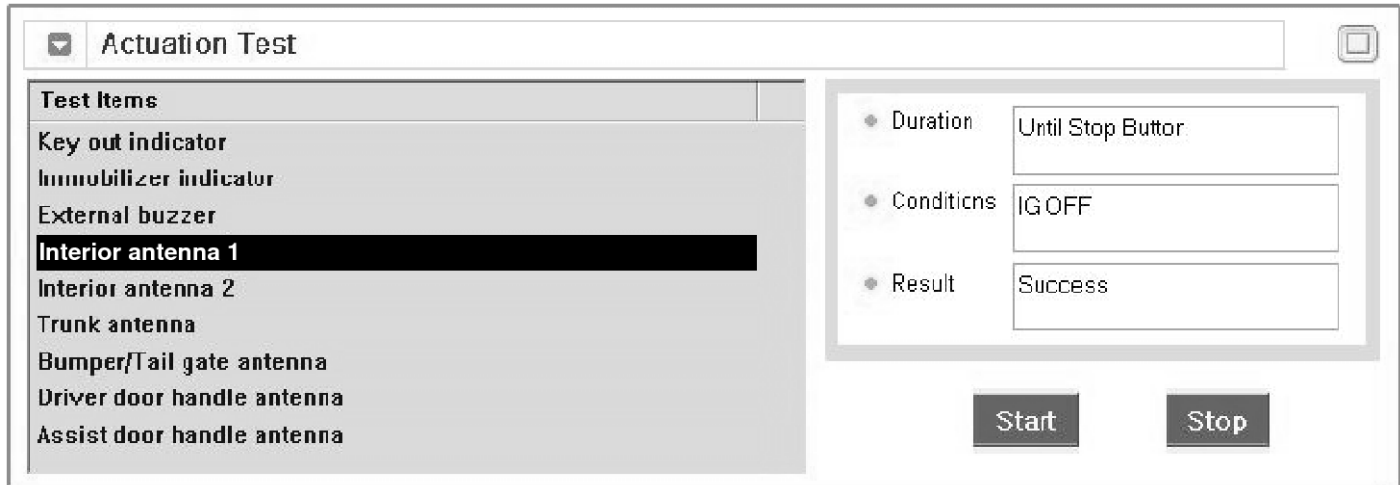


SBKBE9011N

# Smart key System

## BE-85

- Set the smart key near the related antenna and operate it with a GDS.



SBKBE9012N

- If the LED of smart key is blinking, the smart key is normal.
- If the LED of smart key is not blinking, check the voltage of smart key battery.

### 6. Antenna actuation

- INTERIOR Antenna 1
- INTERIOR Antenna 2
- Trunk antenna
- BUMPER/Antenna
- DRV\_DR Antenna
- AST\_DR Antenna



دیجیتال خودرو (مسئولیت محدود)  
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

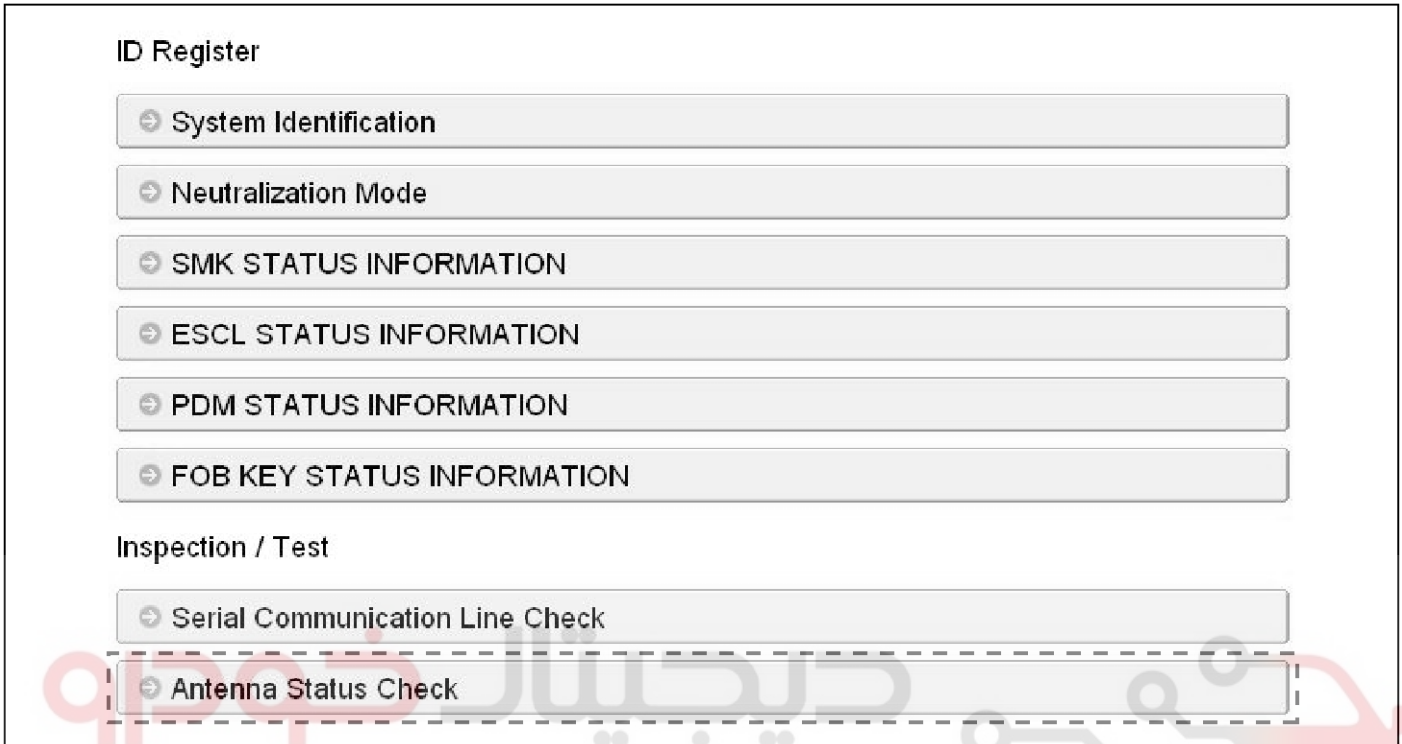
# BE-86

# Body Electrical System

## Antenna Status Check

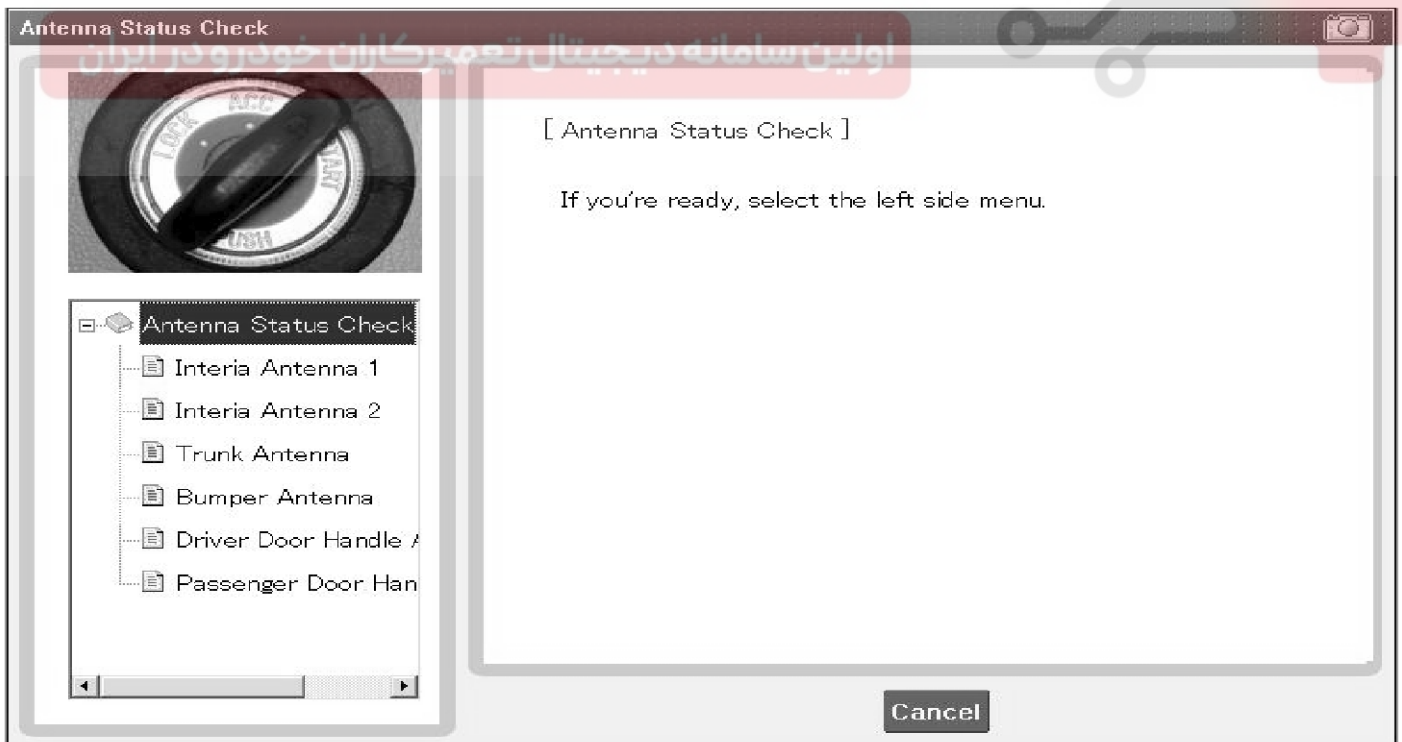
1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.

2. Select the "Antenna Status Check".



3. After IG ON, select the "Antenna Status Check".

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SBKBE9014N

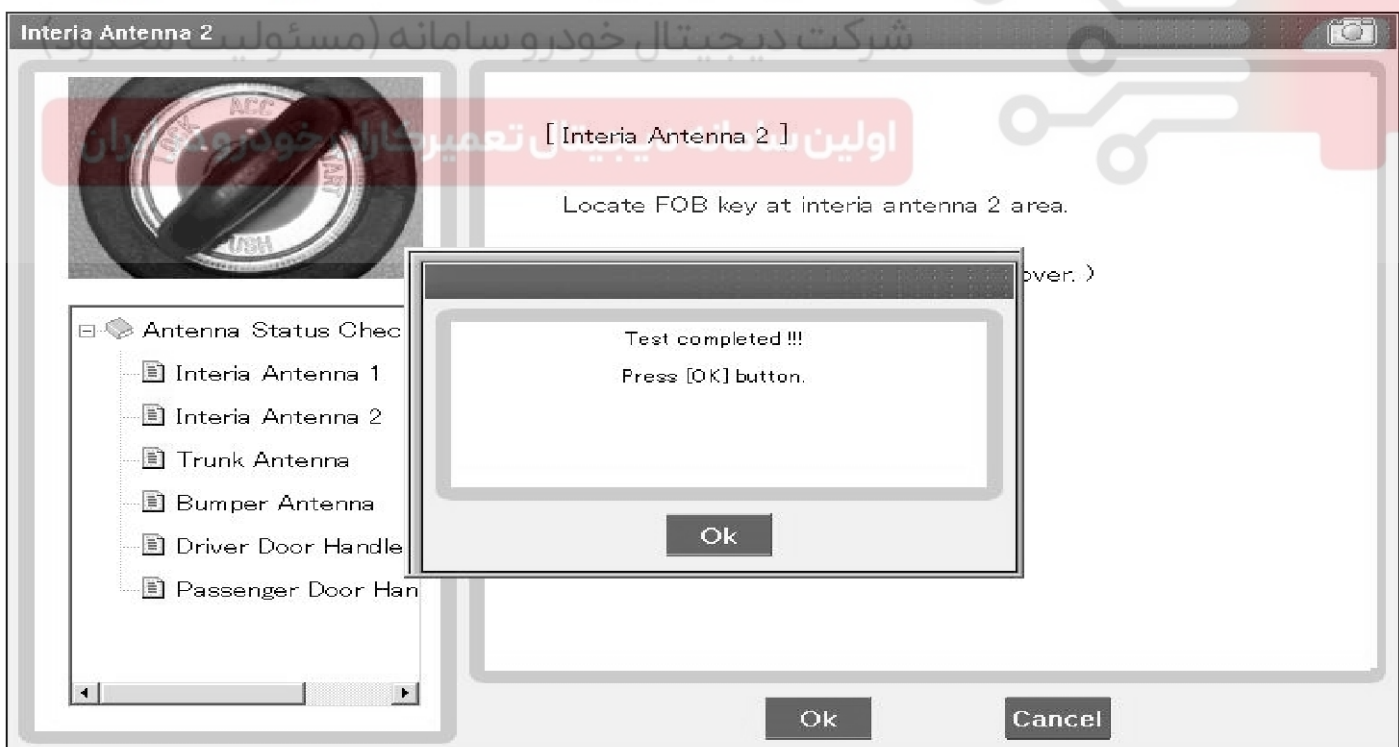
# Smart key System

# BE-87

4. Set the smart key near the related antenna and operate it with a GDS.



SBKBE9015N



SBKBE9016N

**BE-88****Body Electrical System**

5. If the smart key runs normal , the related antenna, smart key(transmission, reception) and exterior receiver are normal.
6. Antenna status
  - INTERIOR Antenna 1
  - INTERIOR Antenna 2
  - Trunk antenna
  - BUMPER/Antenna
  - DRV\_DR Antenna
  - AST\_DR Antenna

**Serial Communication Status Check**

1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.
2. Select the "Serial Communication Line Check".

**ID Register**

→ System Identification

→ Neutralization Mode

→ SMK STATUS INFORMATION

→ ESCL STATUS INFORMATION

→ PDM STATUS INFORMATION

→ FOB KEY STATUS INFORMATION

**Inspection / Test**

→ Serial Communication Line Check

→ Antenna Status Check

SBKBE9142N



# Smart key System

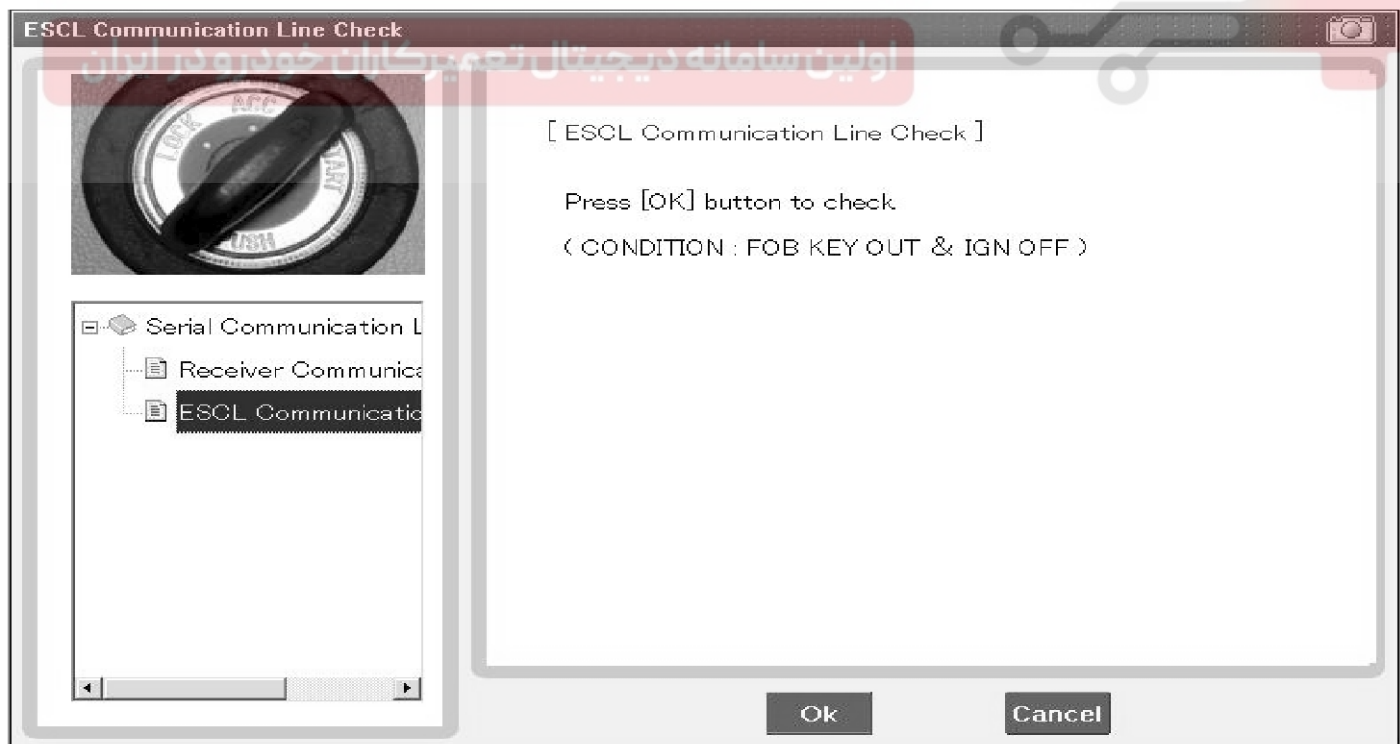
# BE-89

3. After IG ON, select the "Receiver Communication Line Check".



SBKBE9018N

4. Check the serial communication line with a GDS.
5. If the receiver communication line runs normal, check the "ESCL Communication Line Check".



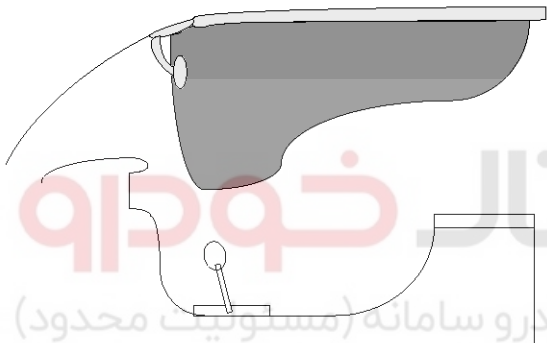
SBKBE9019N

## BE-90

6. If the smart key runs normal, the communication of smart key unit, exterior receiver and ESCL are normal.
7. If the smart key runs abnormal, check the following items.
  - Disconnection or no response of the exterior receiver communication line.
  - The exterior receiver communication line disconnection and ground connection.
  - The ESCL disconnection or no response
  - The ESCL disconnection and ground connection

### Interior Antenna Actuation Check

1. Set the smart key in the following shade area and check the IG ON.

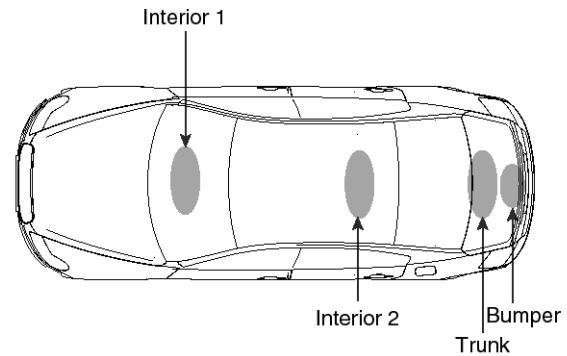


KTCF113A

2. If the ignition is ON, the antenna runs normal.
3. Check the interior antenna ignition mode.

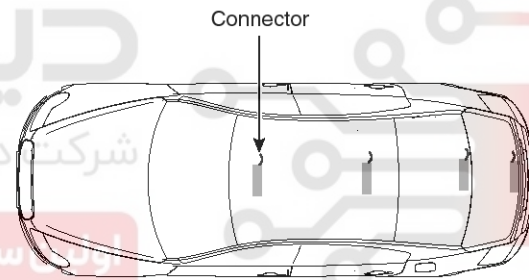
## Body Electrical System

4. Set the smart key in the following shade area and actuate the antenna. Check the LED of smart key is blinking.



SBKBE9029L

5. If the LED of smart key is not blinking, check the antenna in shade area.



SYFBE0026L

# Smart key System

# BE-91

## FOB Status Check

1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.

2. After IG ON, select the "FOB KEY STATUS INFO".

**ID Register**


- System Identification
- Neutralization Mode
- SMK STATUS INFORMATION
- ESCL STATUS INFORMATION
- PDM STATUS INFORMATION
- **FOB KEY STATUS INFORMATION**

**Inspection / Test**

- Serial Communication Line Check
- Antenna Status Check

SBKBE9143N

**FOB KEY STATUS INFORMATION**



[ FOB KEY Status Information ]

KEY Status : NORMAL  
 BUTTON Status : -

Ok

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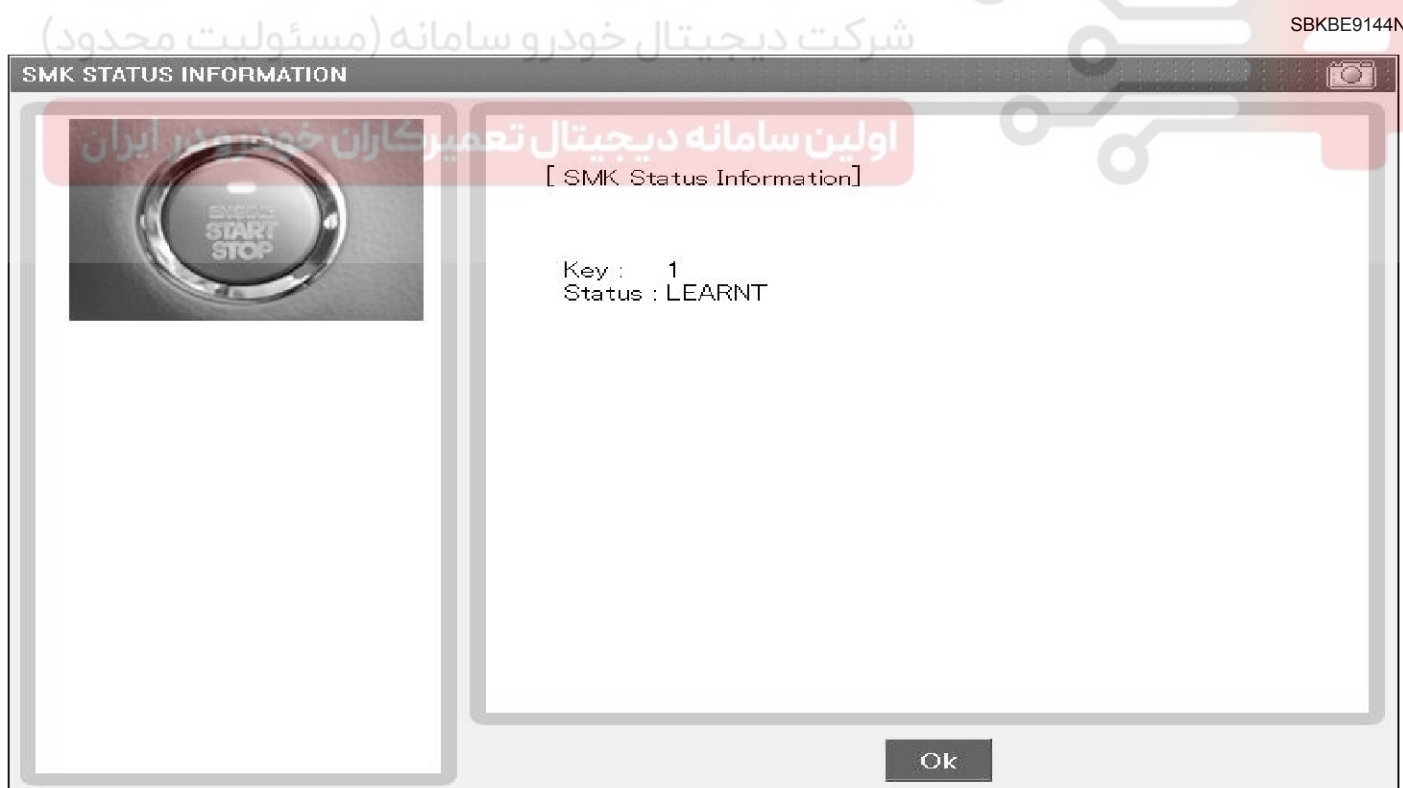
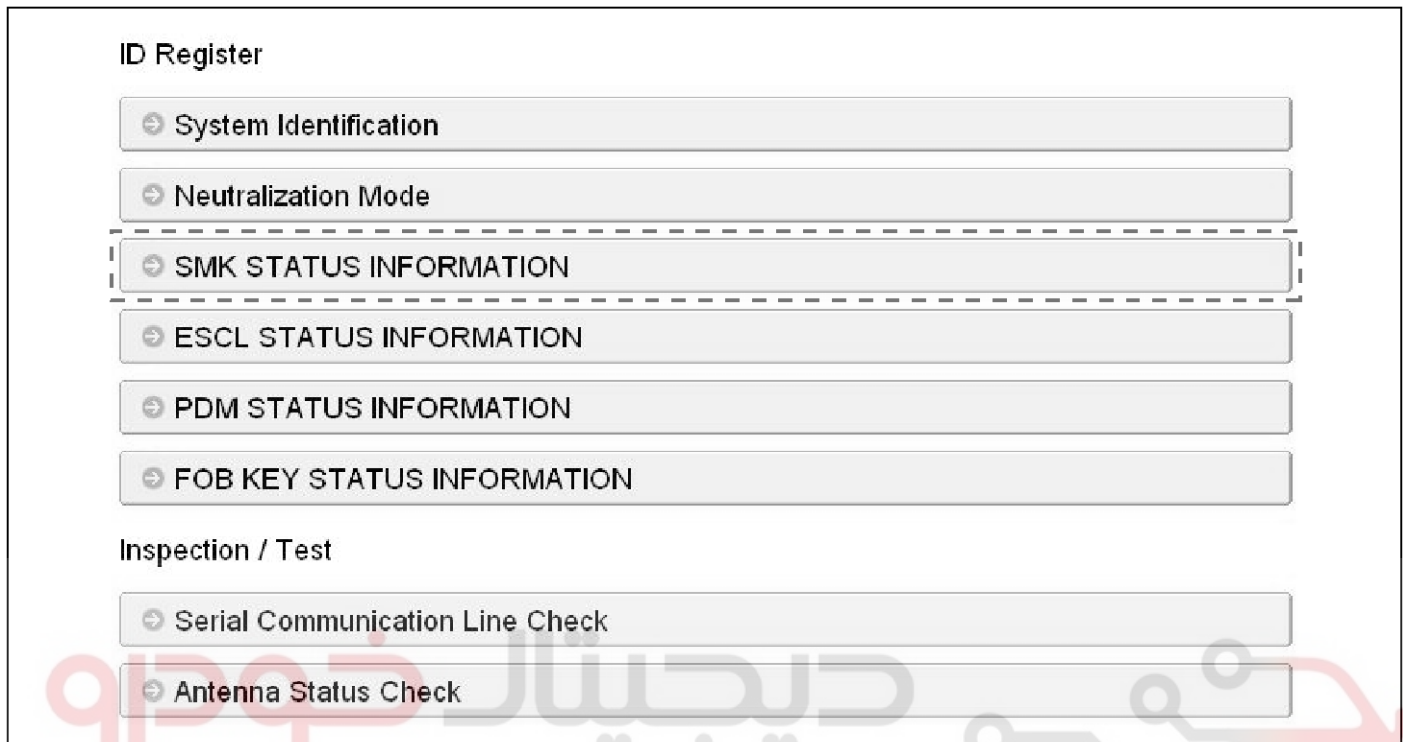
## BE-92

## Body Electrical System

## Smart Key Status Check

1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.

2. After IG ON, select the "SMK STATUS INFO".



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# Smart key System

# BE-93

## PDM Status Check

1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.

2. After IG ON, select the "PDM STATUS INFO".


**ID Register**

- System Identification
- Neutralization Mode
- SMK STATUS INFORMATION
- ESCL STATUS INFORMATION
- PDM STATUS INFORMATION
- FOB KEY STATUS INFORMATION

**Inspection / Test**

- Serial Communication Line Check
- Antenna Status Check

PDM STATUS INFORMATION
SBKBE9145N



[ PDM Status Information ]

PDM STATUS : LEARNT  
PDM CONNECT STATUS : CONNECT

Ok

SBKBE9023N

# BE-94

# Body Electrical System

## ESCL Status Check

1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.

2. After IG ON, select the "ESCL STATUS INFO".

**ID Register**


- System Identification
- Neutralization Mode
- SMK STATUS INFORMATION
- ESCL STATUS INFORMATION
- PDM STATUS INFORMATION
- FOB KEY STATUS INFORMATION

**Inspection / Test**

- Serial Communication Line Check
- Antenna Status Check

SBKBE9146N

ESCL STATUS INFORMATION



[ ESCL Status Information ]

DELPHI  
 ESCL Last ENABLE Status: ON  
 ESCL BOLT STATUS : UNLOCKED  
 ESCL LEARNING STATUS : NORMAL

Ok

SBKBE9024N



# Smart key System

# BE-95

## Neutralization Status Check

1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.

2. After IG ON, select the "Neutralization mode".

**ID Register**


- System Identification
- Neutralization Mode
- SMK STATUS INFORMATION
- ESCL STATUS INFORMATION
- PDM STATUS INFORMATION
- FOB KEY STATUS INFORMATION

**Inspection / Test**

- Serial Communication Line Check
- Antenna Status Check

SBKBE9147N

**Neutralization Mode**



[ Neutralization Mode ]

If you're ready, select the left side menu.

**Cancel**

اولین سامانه دیجیتال تعمیرگاه

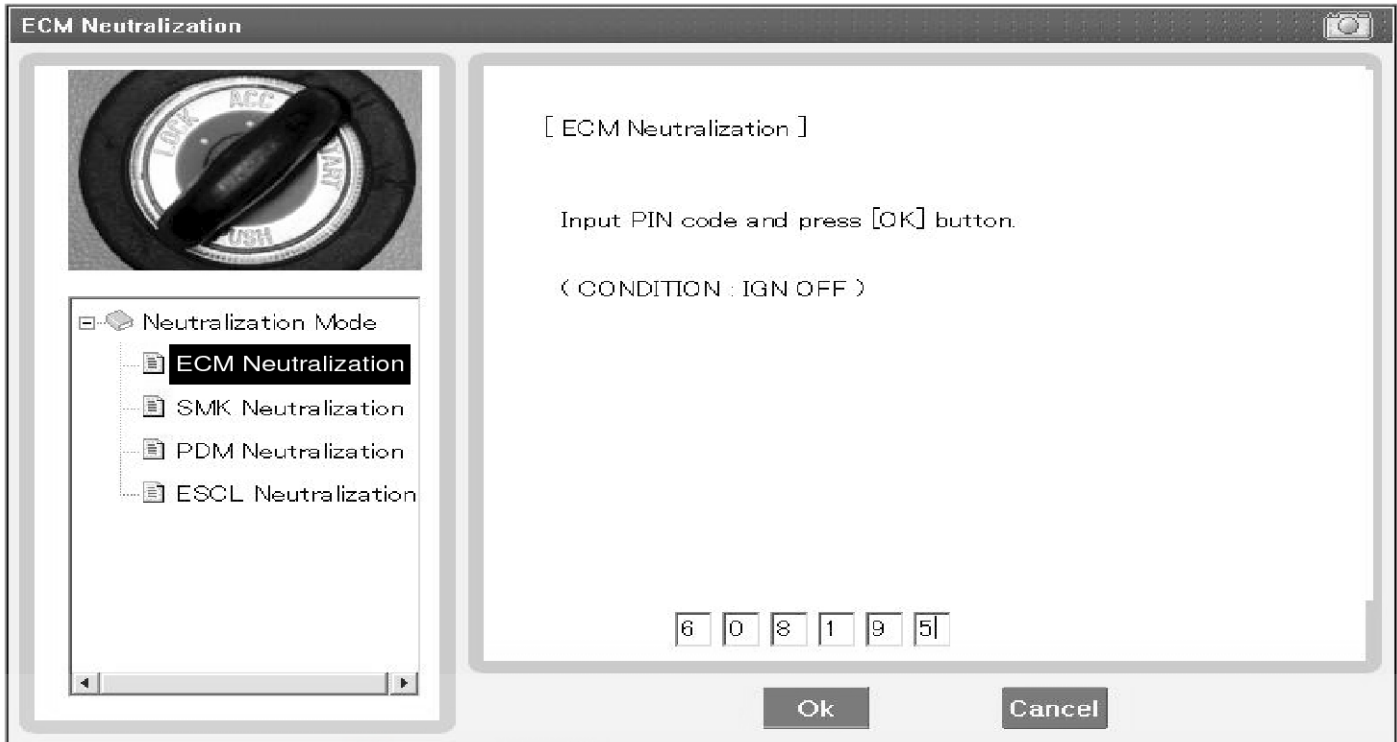
- Neutralization Mode
  - ECM Neutralization
  - SMK Neutralization
  - PDM Neutralization
  - ESCL Neutralization

SBKBE9025N

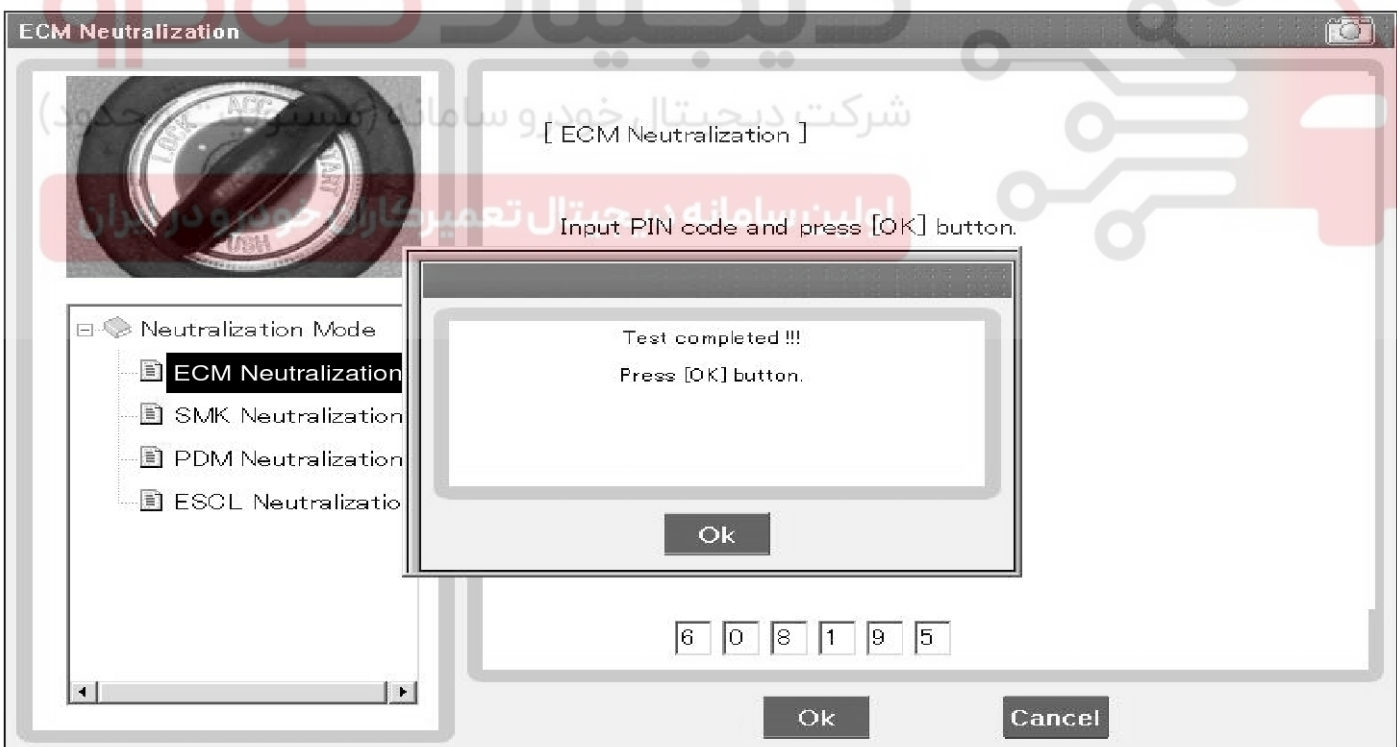


# BE-96

# Body Electrical System



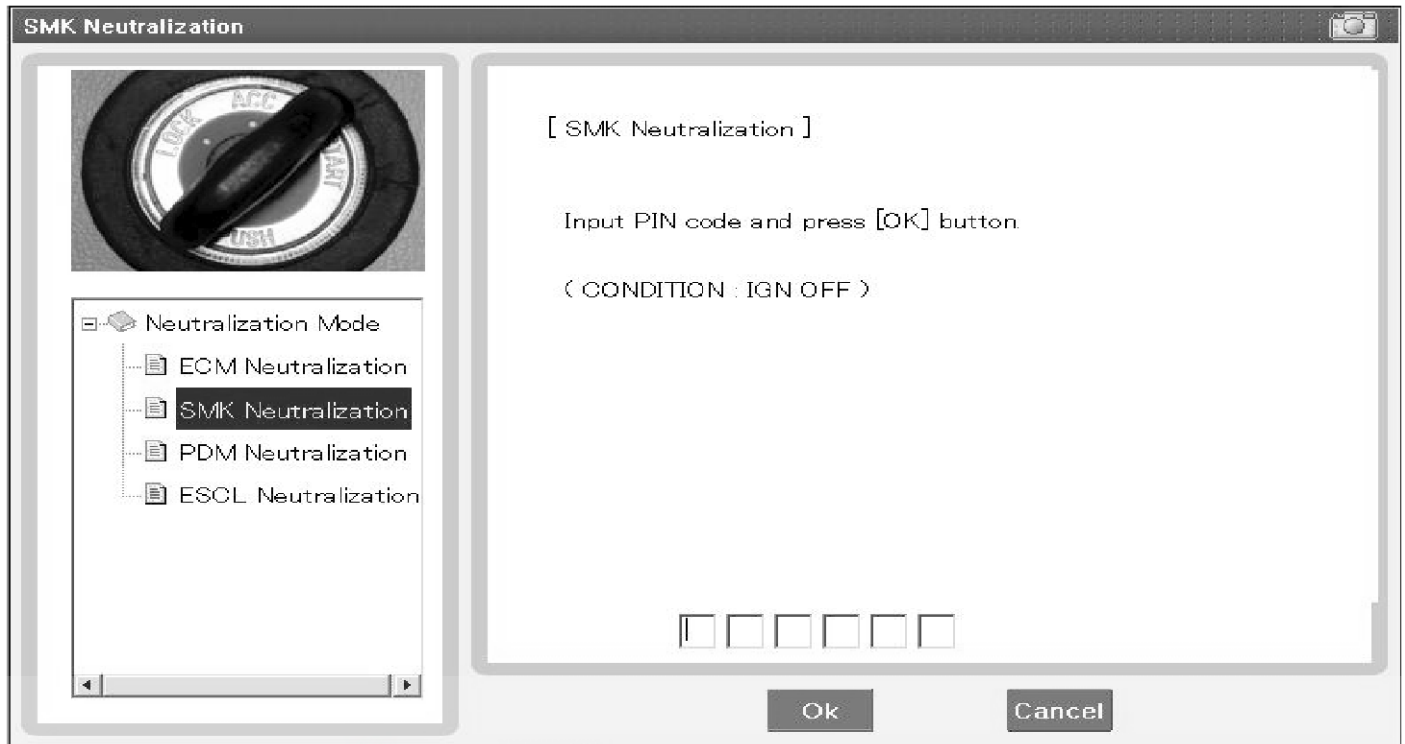
SBKBE9074N



SBKBE9075N

# Smart key System

# BE-97



SBKBE9026N



SBKBE9077N

# BE-98

# Body Electrical System

SMK Neutralization

[ SMK Neutralization ]

Input PIN code and press [OK] button.

Test completed !!!  
Press [OK] button.

Ok

6 0 8 1 9 5

Ok Cancel

SBKBE9078N

PDM Neutralization

[ PDM Neutralization ]

Input PIN code and press [OK] button.

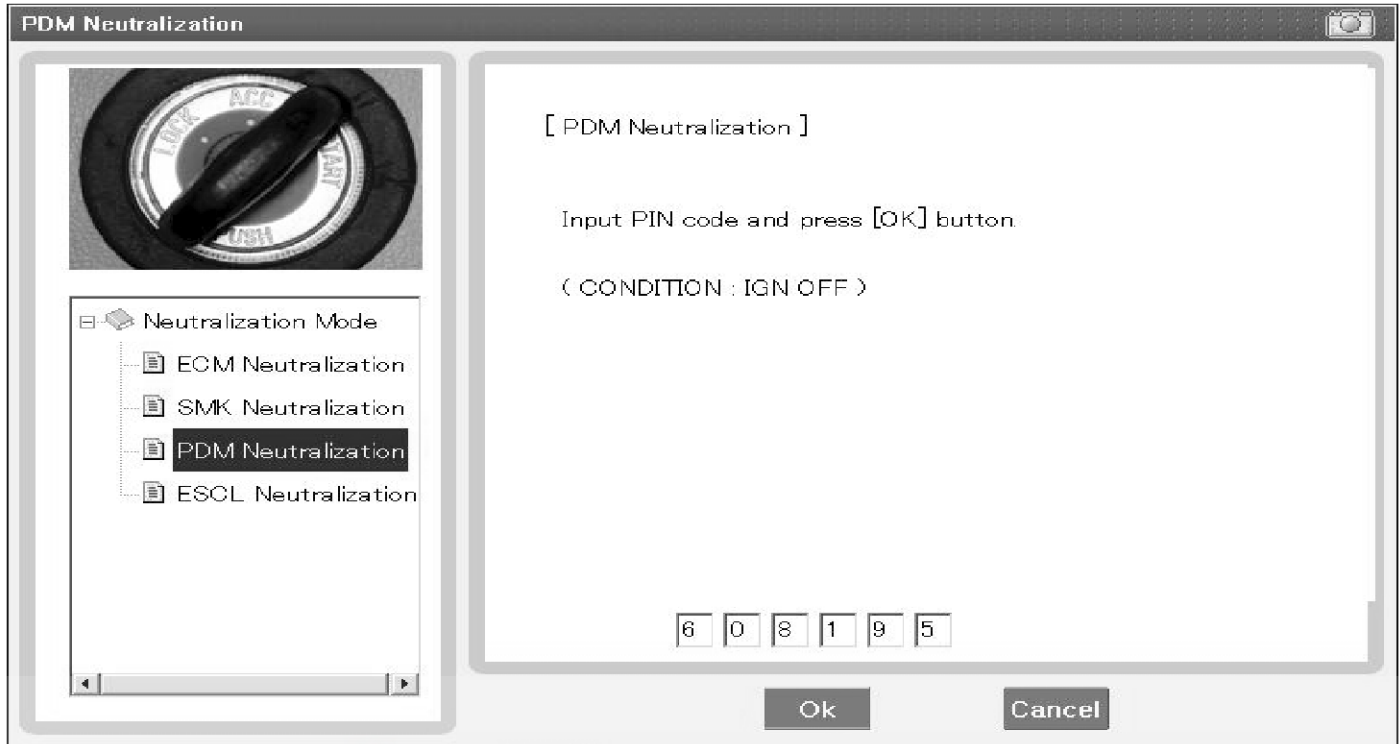
( CONDITION : IGN OFF )

Ok Cancel

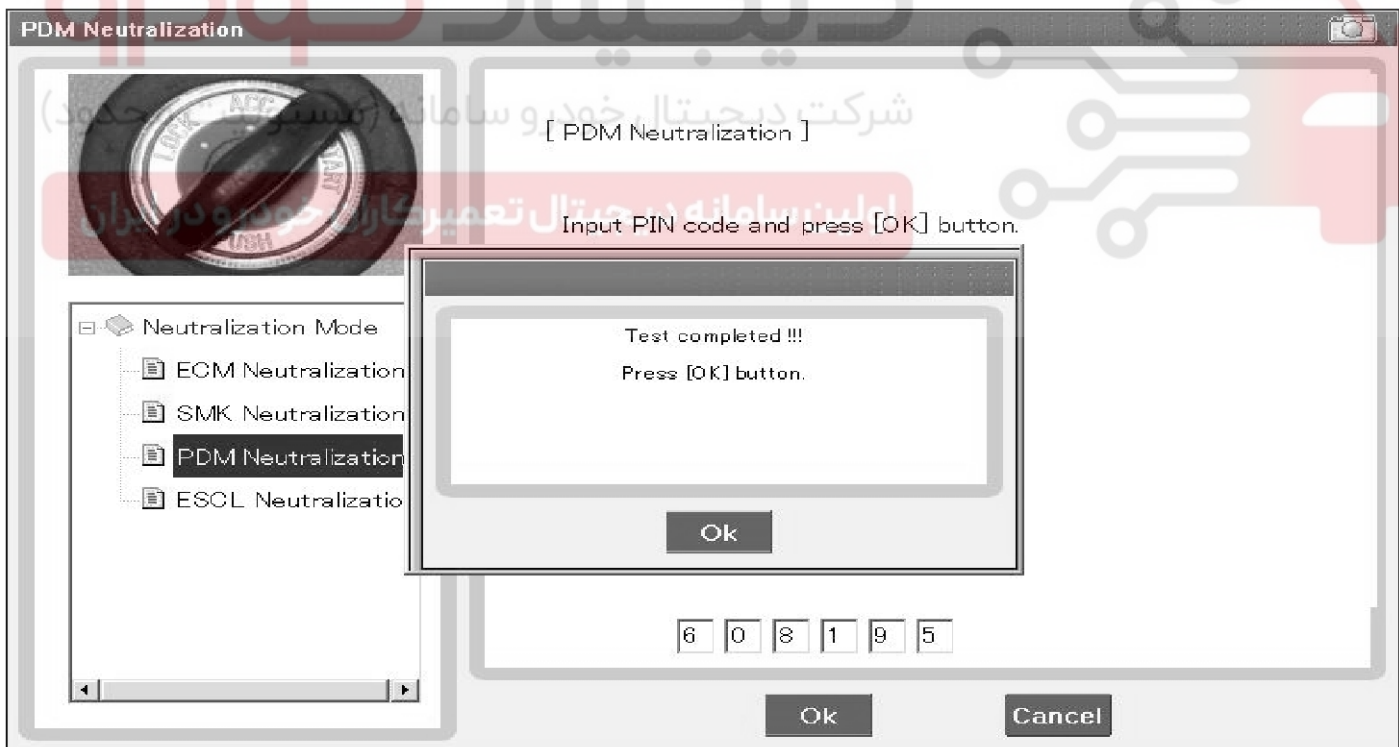
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# Smart key System

# BE-99



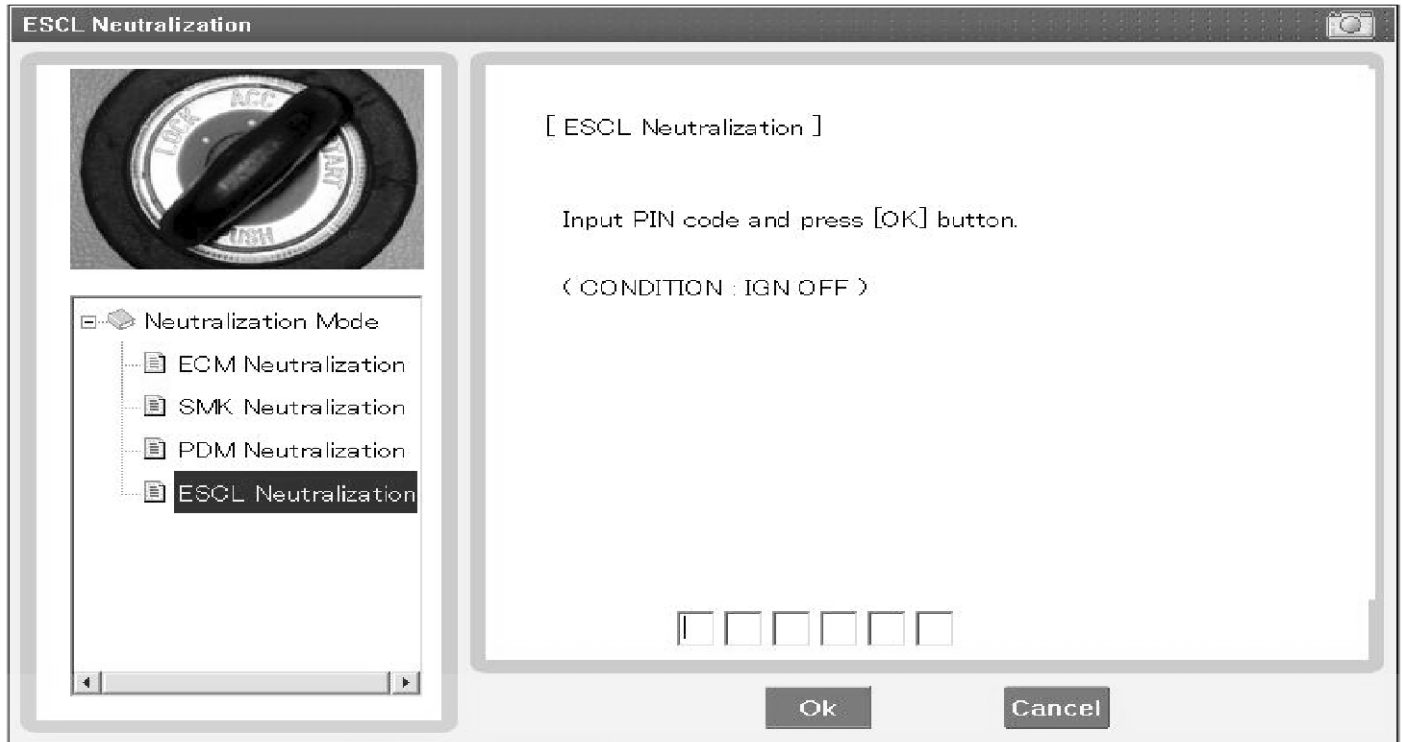
SBKBE9079N



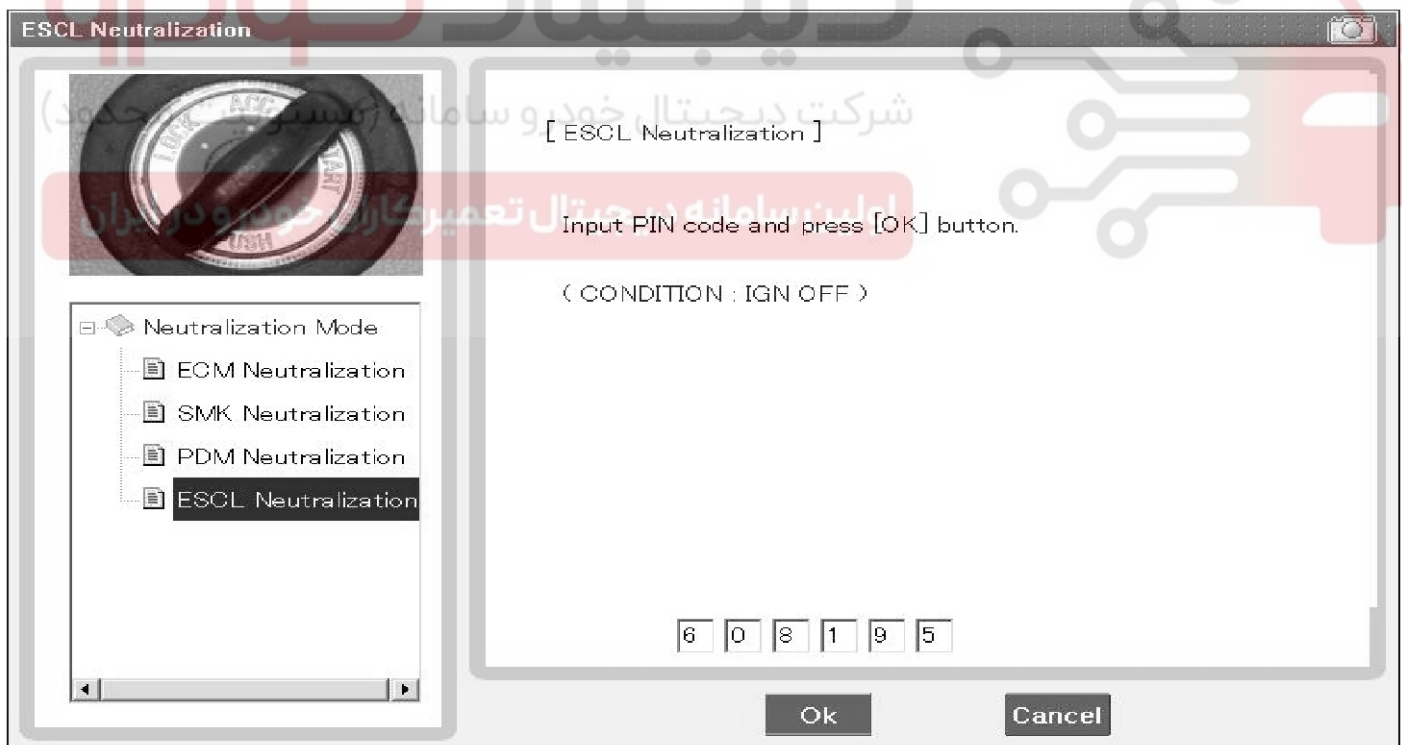
SBKBE9080N

# BE-100

# Body Electrical System



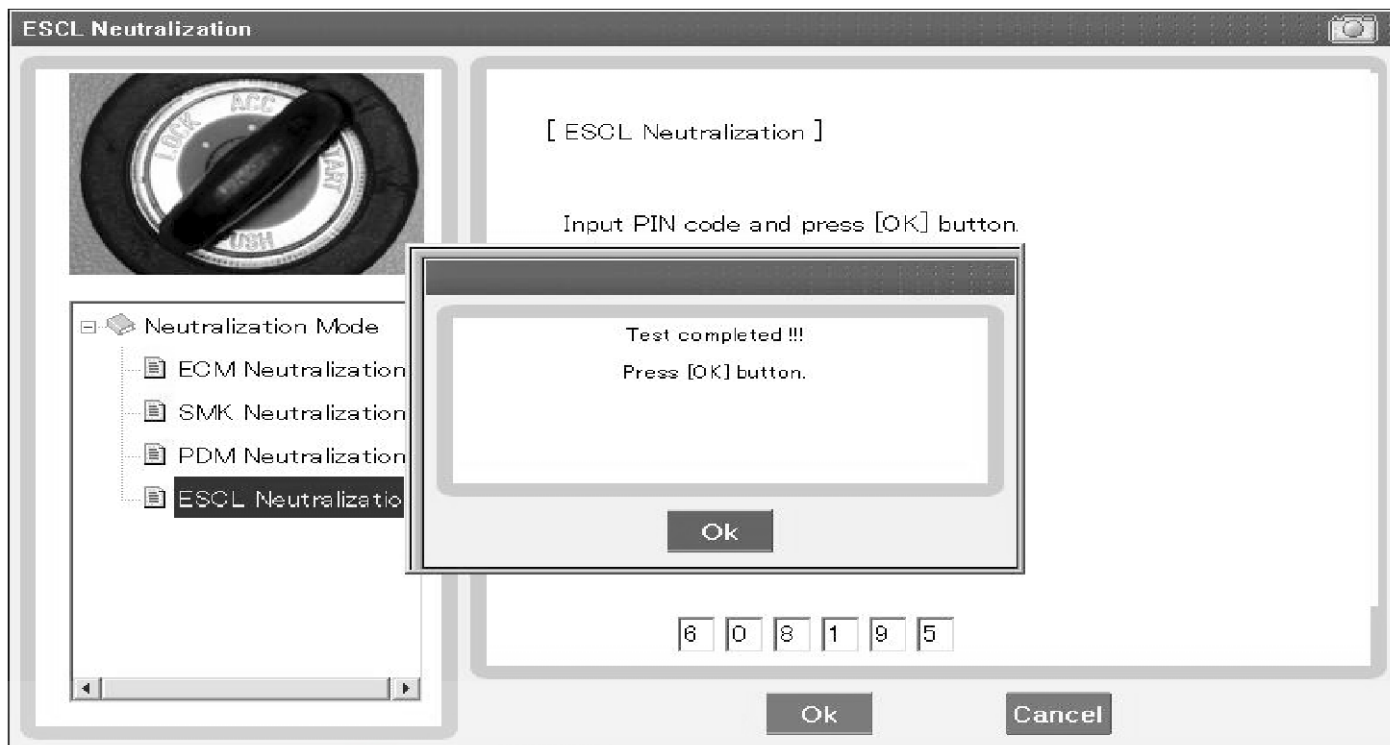
SBKBE9028N



SBKBE9081N

# Smart key System

# BE-101



# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران





## BE-102

## Body Electrical System

## Input Switch List

| No | Item name              | Unit |
|----|------------------------|------|
| 1  | SSB switch2            | -    |
| 2  | ACC                    | -    |
| 3  | IGN1                   | -    |
| 4  | Gear 'P' Position      | -    |
| 5  | Brake switch           | -    |
| 6  | FL Door Lock Button    | -    |
| 7  | FR Door Lock Button    | -    |
| 8  | Trunk Lid switch       | -    |
| 9  | Battery Voltage        | -    |
| 10 | Alternator Voltage     | -    |
| 11 | KEY out Indicator Lamp | -    |
| 12 | Immobilizer Lamp       | -    |
| 13 | External Buzzer        | -    |
| 14 | ESCL Enable            | -    |

## Actuator List

| No. | Item name                 | Condition                        |
|-----|---------------------------|----------------------------------|
| 1   | Immo.indicator Lamp       | Ignition switch ON<br>Engine off |
| 2   | External Buzzer           | Ignition switch ON<br>Engine off |
| 3   | Interior Antenna 1 Active | Ignition switch ON<br>Engine off |
| 4   | Interior Antenna 2 Active | Ignition switch ON<br>Engine off |
| 5   | Trunk Antenna Active      | Ignition switch ON<br>Engine off |
| 6   | Bumper Antenna Active     | Ignition switch ON<br>Engine off |
| 7   | DRV DR Antenna Active     | Ignition switch ON<br>Engine off |
| 8   | AST DR Antenna Active     | Ignition switch ON<br>Engine off |



# Smart key System

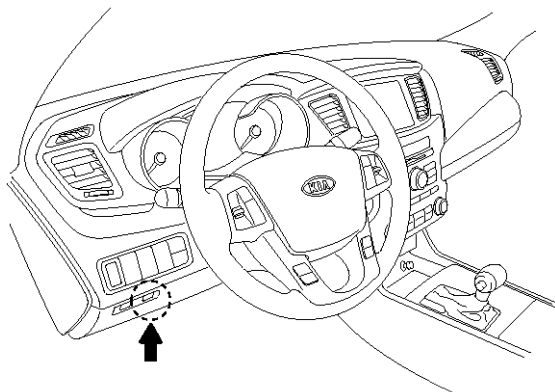
# BE-103

## Smart key

### Smart Key

#### Smart Key Code Saving

1. Connect the DLC cable of GDS to the data link connector in driver side crash pad lower panel, turn the power on GDS.



SVGBE0085D

2. Select the vehicle model and then do "Smart key code saving".

ID Register

Smart Key Code Saving

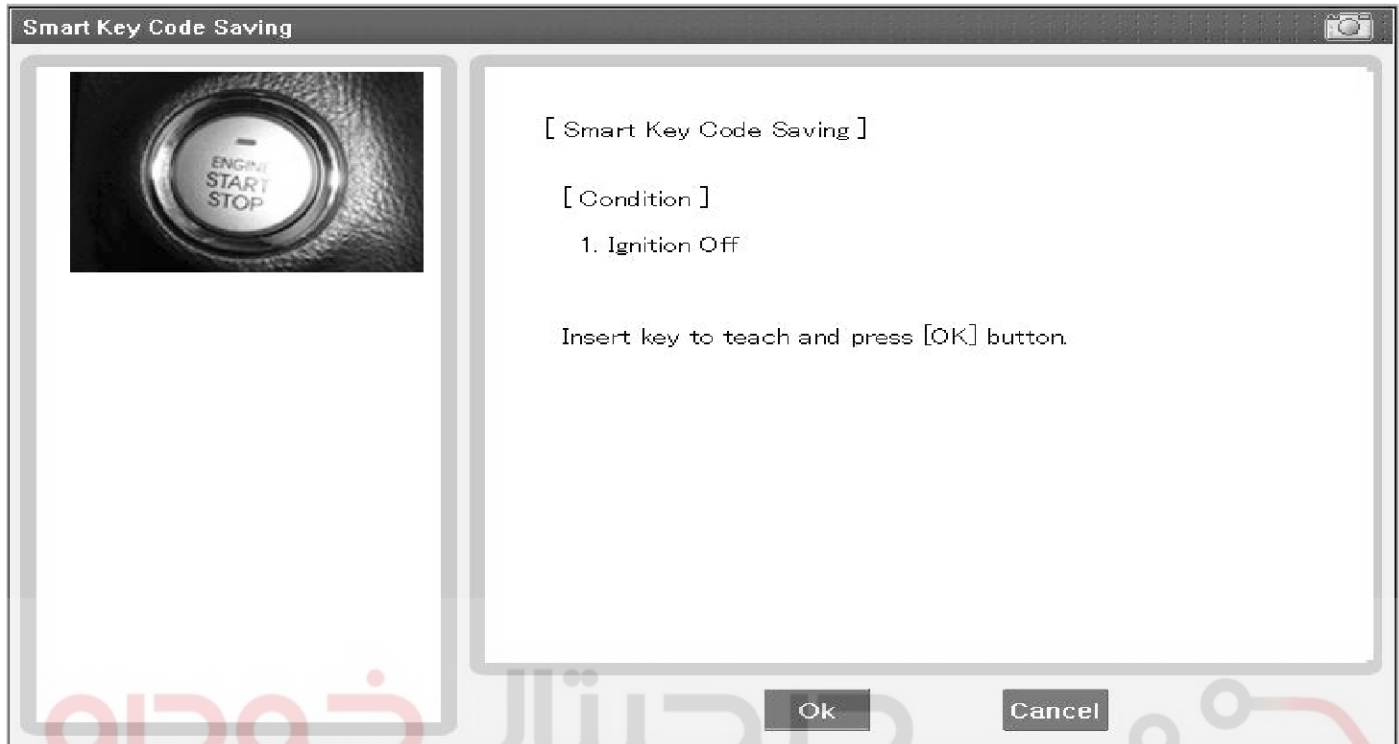
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SBKBE9030N

# BE-104

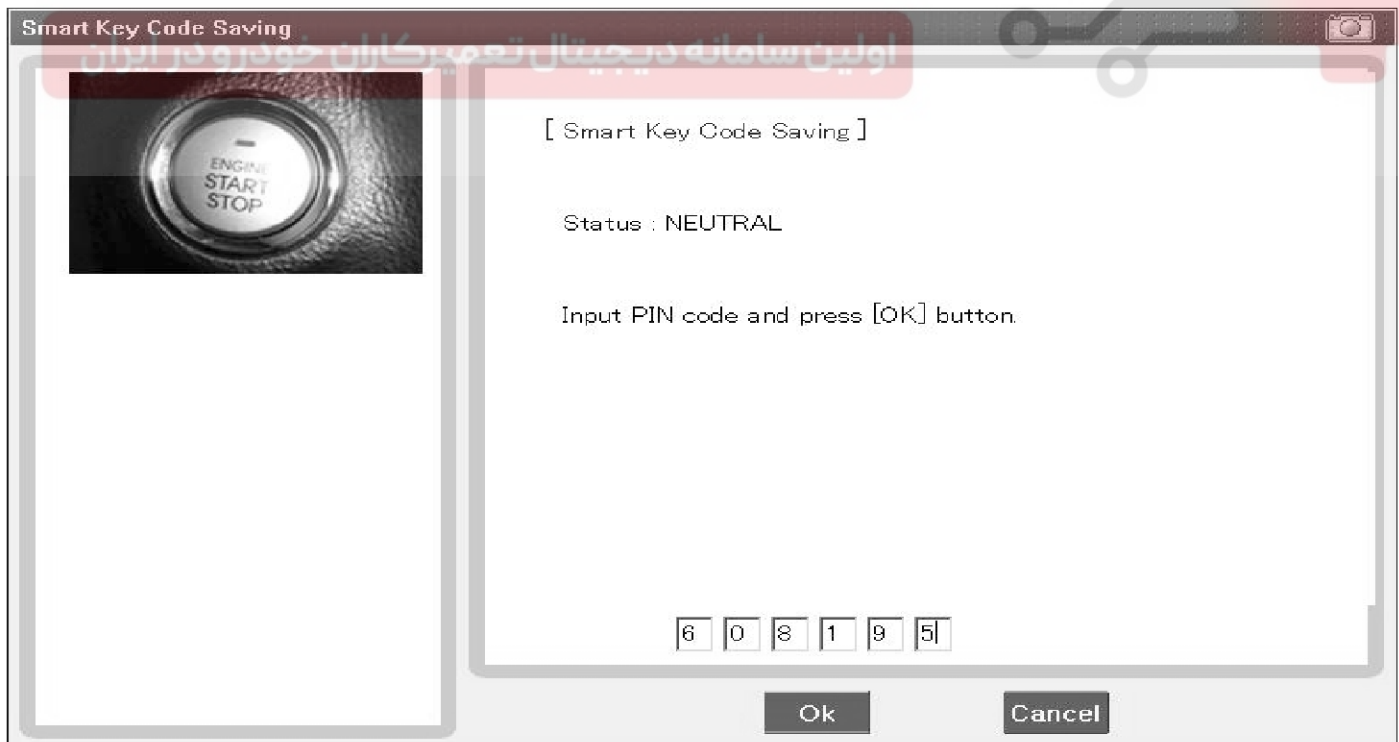
# Body Electrical System

- 3. After selecting "Smart key teaching" menu, push "Enter" key, then the screen will be shown as below.



SBKBE9031N

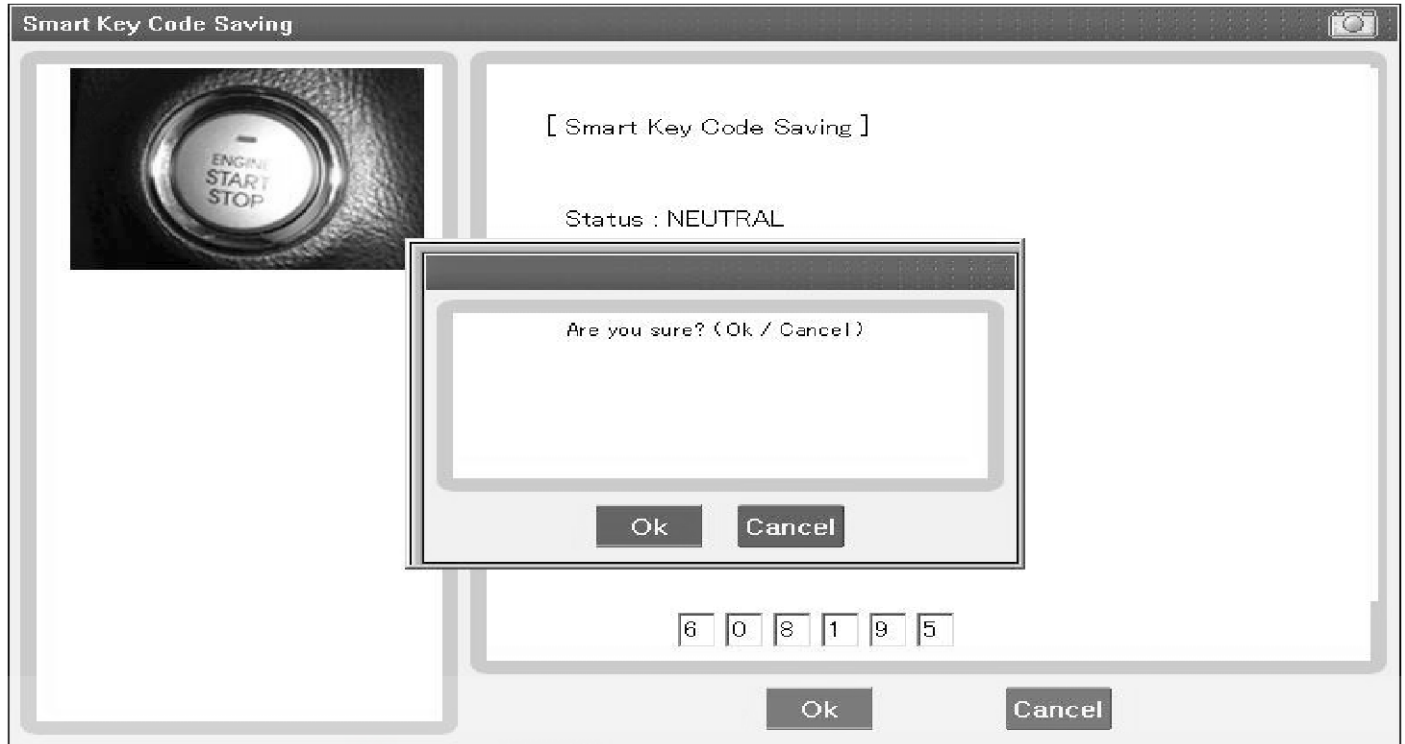
- 4. After inserting the teaching key, push "ENTER" key.
- 5. Input the "Pin code" for first key teaching.



SBKBE9083N

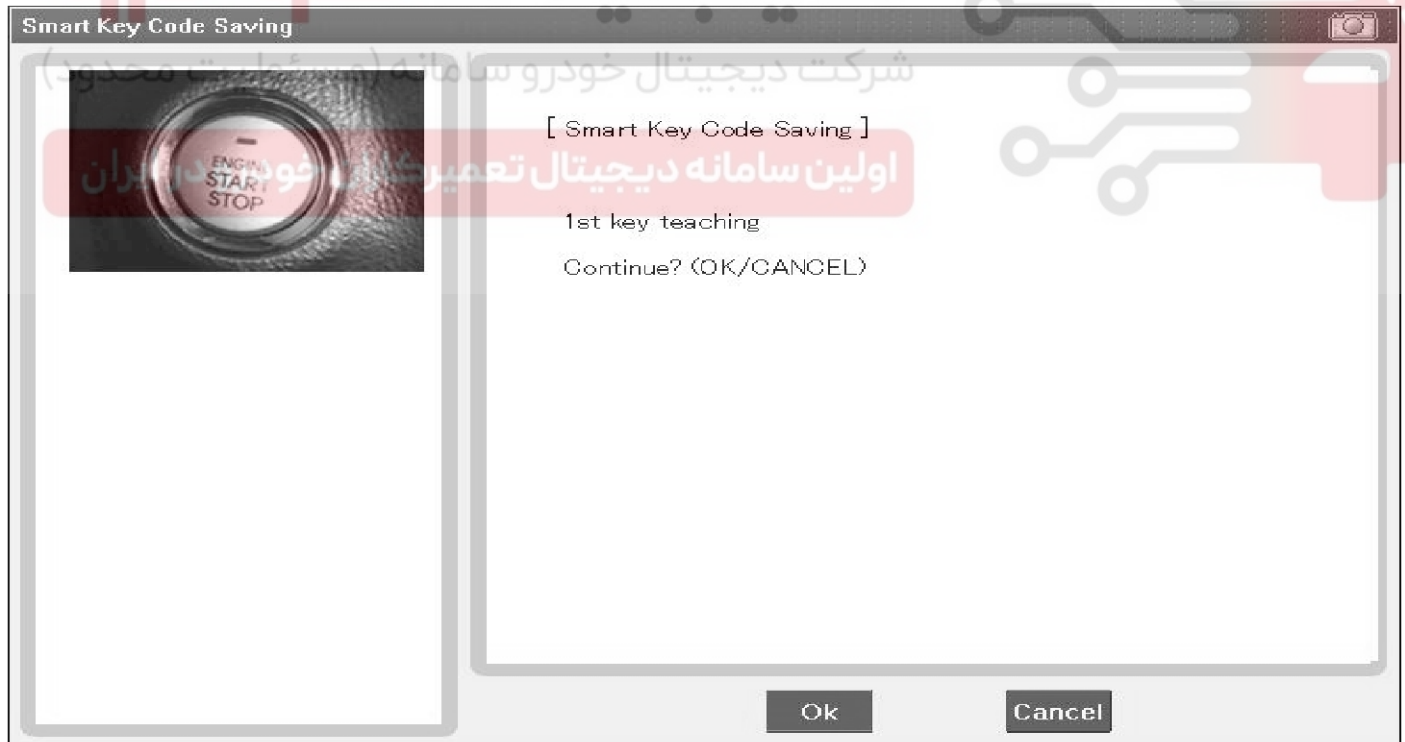
# Smart key System

# BE-105



SBKBE9084N

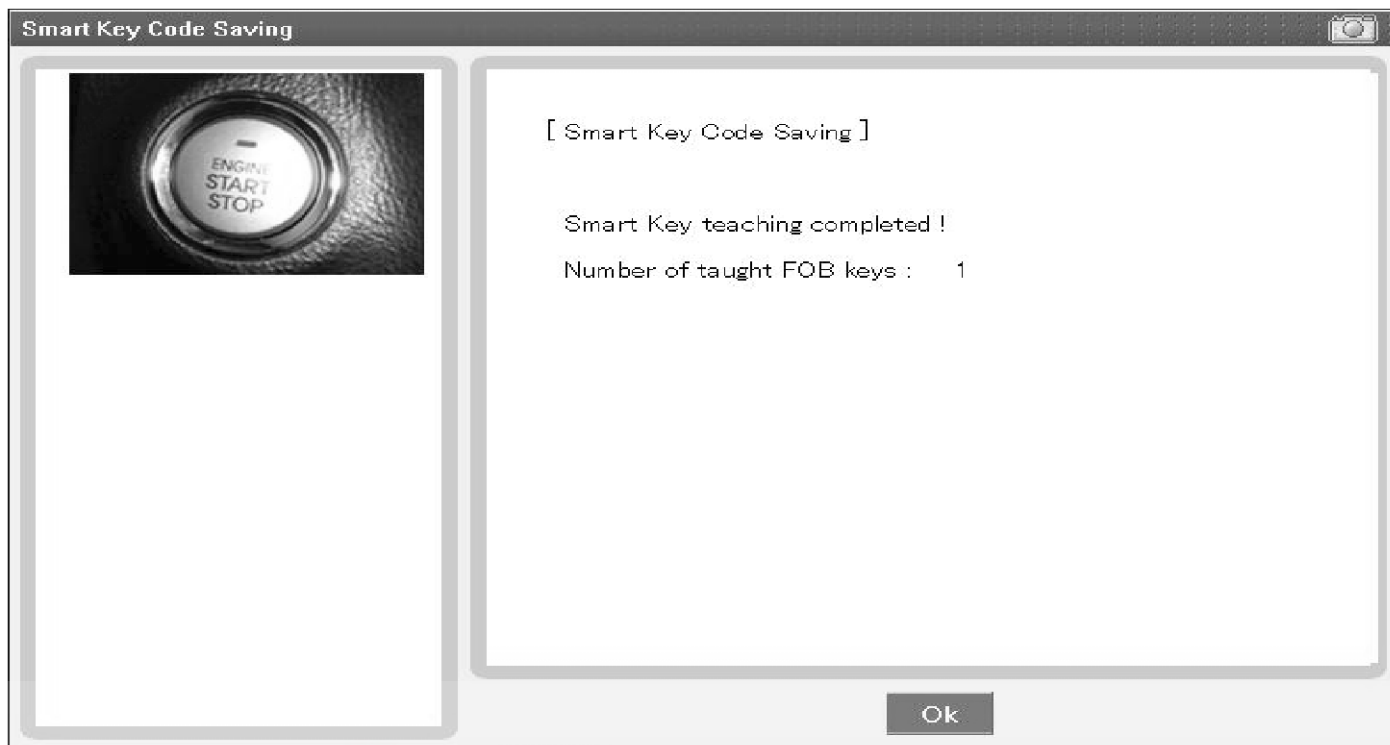
6. Confirm the message "First key teaching completed".



SBKBE9085N

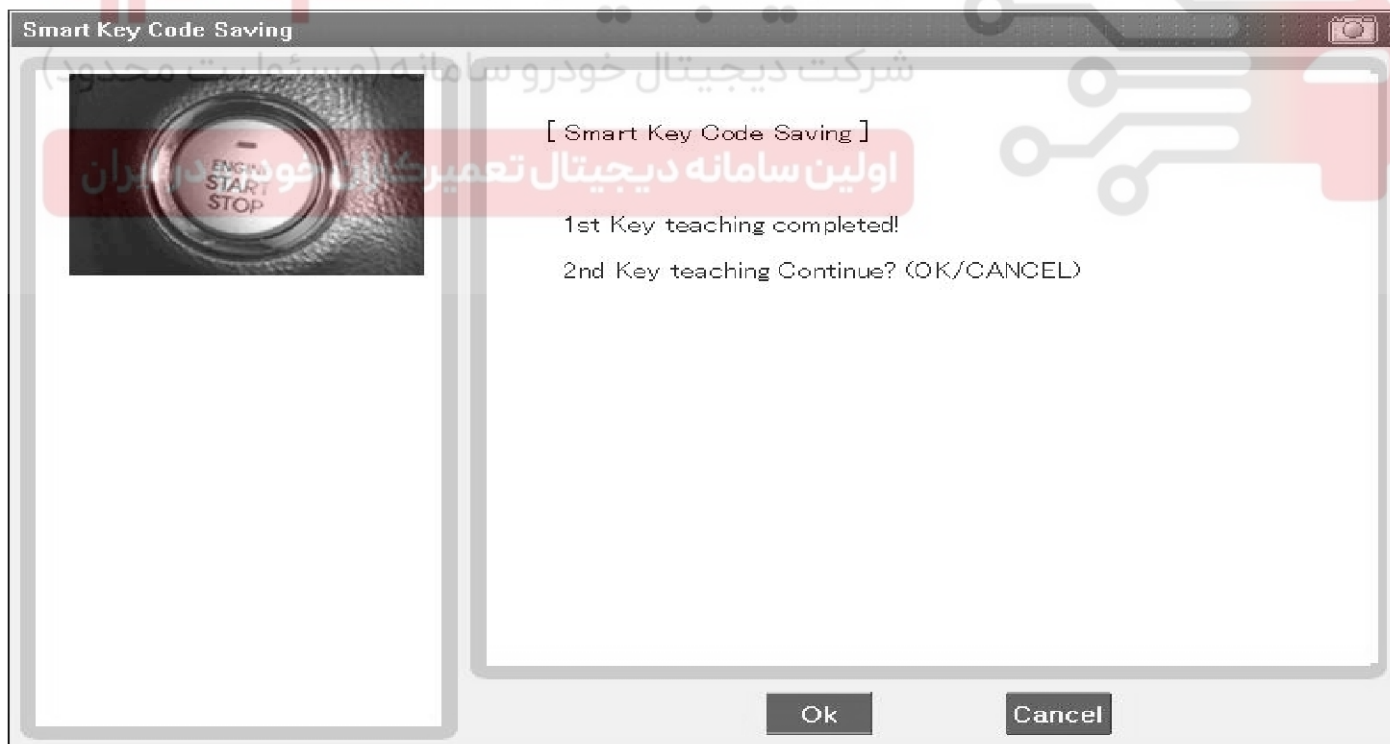
# BE-106

# Body Electrical System



SBKBE9086N

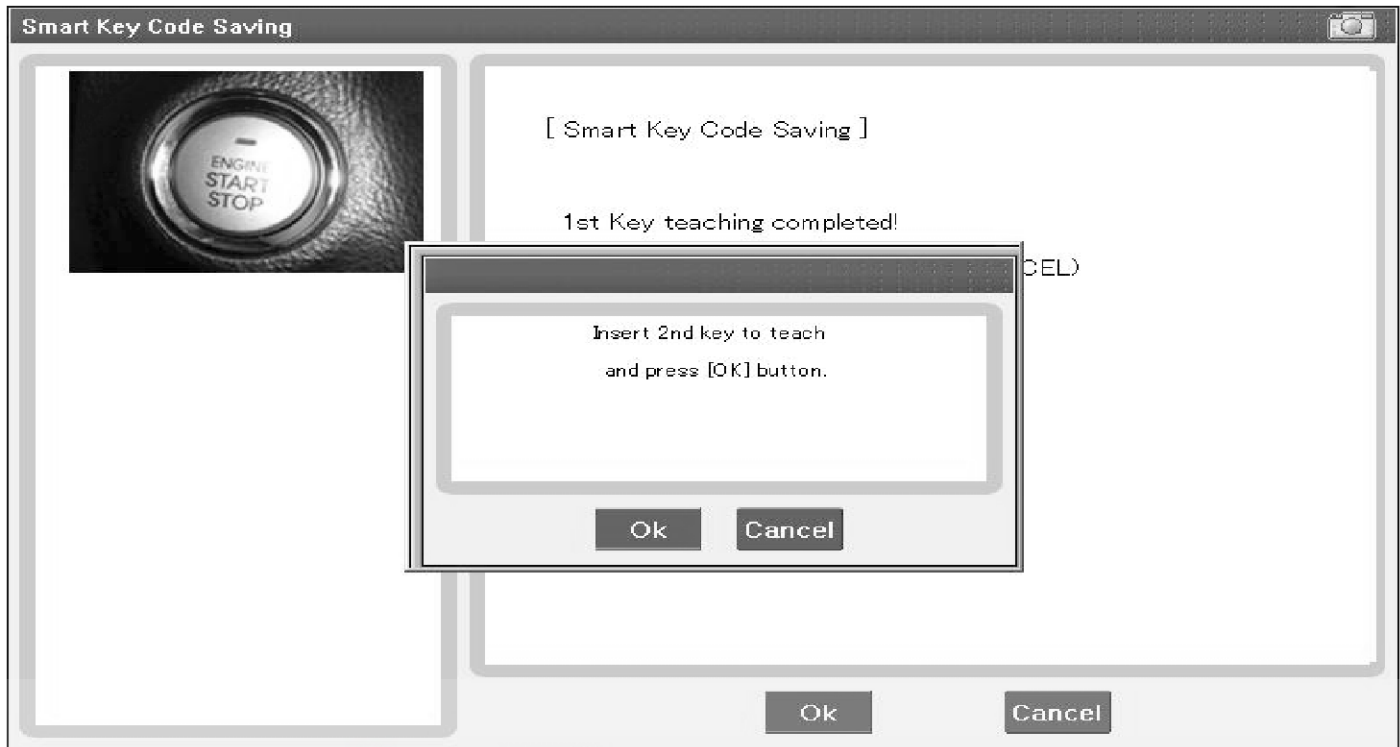
7. Input the "Pin code" for second key teaching.



SBKBE9087N

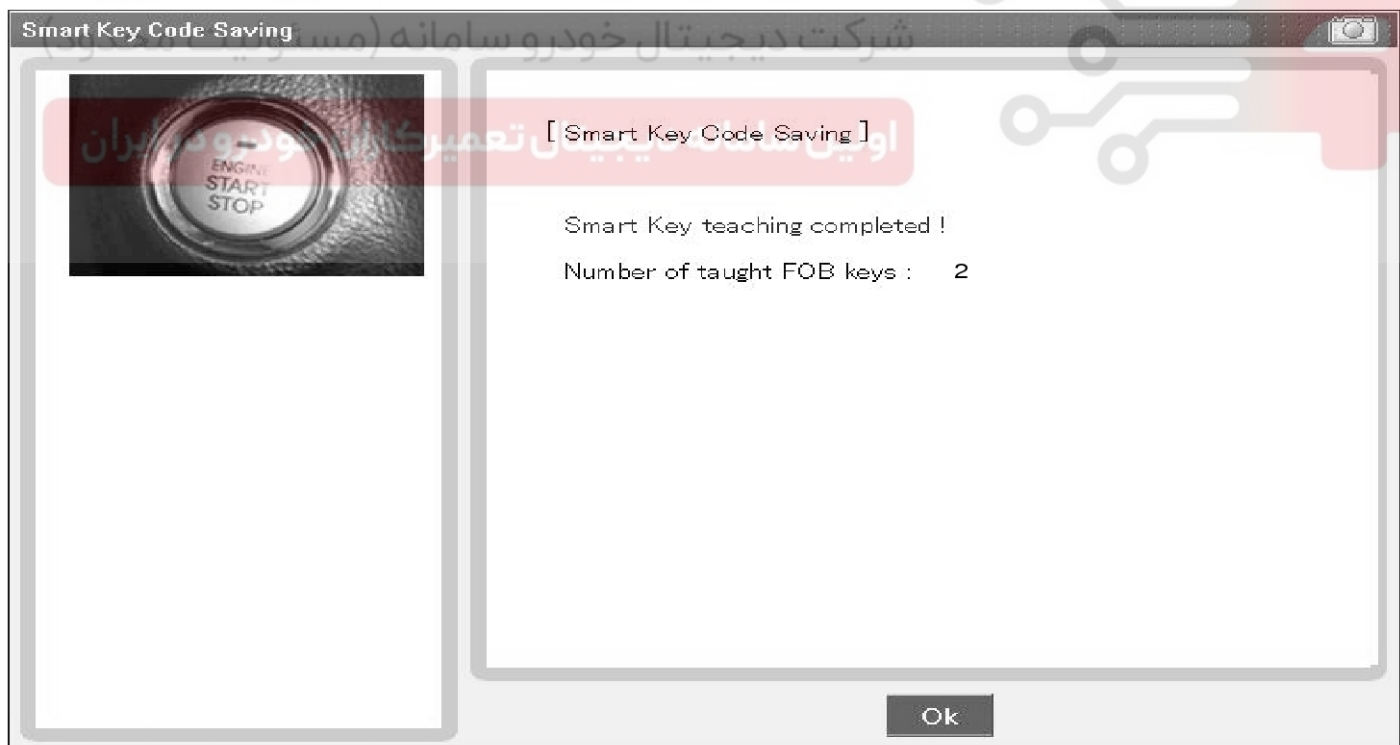
# Smart key System

# BE-107



SBKBE9088N

- 8. Confirm the message "Second key teaching completed".



SBKBE9089N

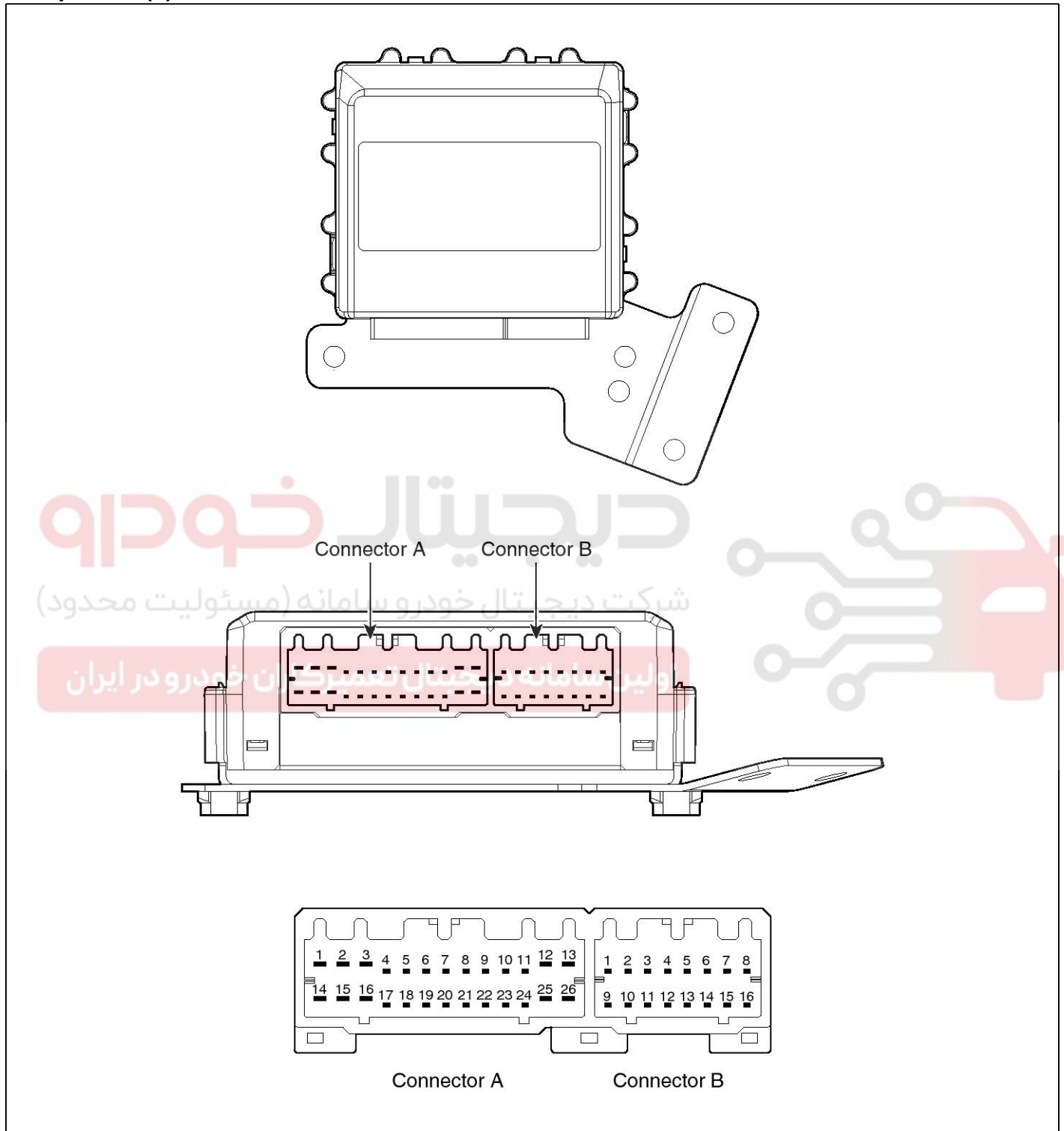
- 9. Then the screen will be shown as below when key teaching process is completed.

# BE-108

# Body Electrical System

## Smart key unit

### Component (1)



SVGBE0060L

## Smart key System

## BE-109

## Connector Pin Information

| Pin | Connector A                    | Pin | Connector B                |
|-----|--------------------------------|-----|----------------------------|
| 1   | Battery                        | 1   | Interior 2 antenna 2       |
| 2   | Immobilizer Indicator          | 2   | Interior 1 antenna 2       |
| 3   | GND 1                          | 3   | -                          |
| 4   | -                              | 4   | -                          |
| 5   | -                              | 5   | Trunk antenna 1            |
| 6   | Front left door lock / unlock  | 6   | Bumper antenna 1           |
| 7   | External buzzer                | 7   | Front right side antenna 1 |
| 8   | ALT L                          | 8   | Front left side antenna 1  |
| 9   | ACC                            | 9   | Interior 2 antenna 1       |
| 10  | CAN high                       | 10  | Interior 1 antenna 1       |
| 11  | CAN low                        | 11  | -                          |
| 12  | ESCL Communication             | 12  | -                          |
| 13  | RF Communication               | 13  | Trunk antenna 2            |
| 14  | IGN 1                          | 14  | Bumper antenna 2           |
| 15  | P position                     | 15  | Front right side antenna 2 |
| 16  | GND 2                          | 16  | Front left side antenna 2  |
| 17  | ESCL Enable                    |     |                            |
| 18  | -                              |     |                            |
| 19  | Front right door lock / unlock |     |                            |
| 20  | -                              |     |                            |
| 21  | Diagnosis                      |     |                            |
| 22  | SSB switch                     |     |                            |
| 23  | Brake                          |     |                            |
| 24  | EMS communication              |     |                            |
| 25  | -                              |     |                            |
| 26  | -                              |     |                            |

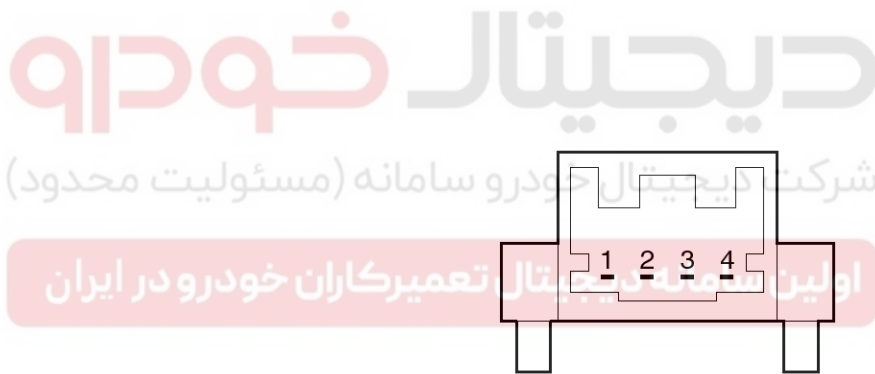
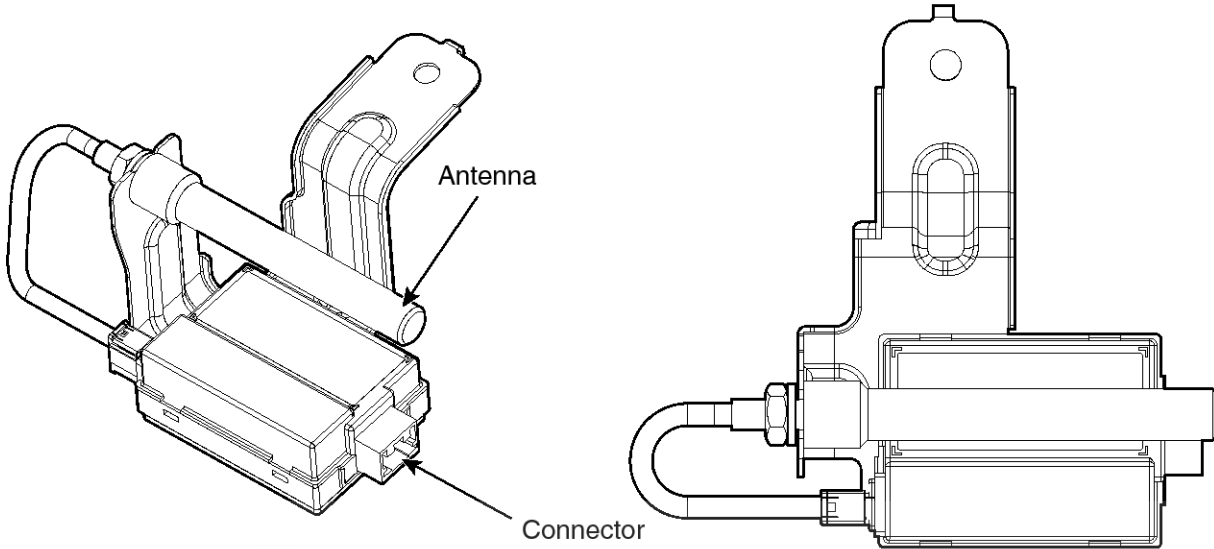


# BE-110

# Body Electrical System

## Component (2)

[RF Receiver Unit]



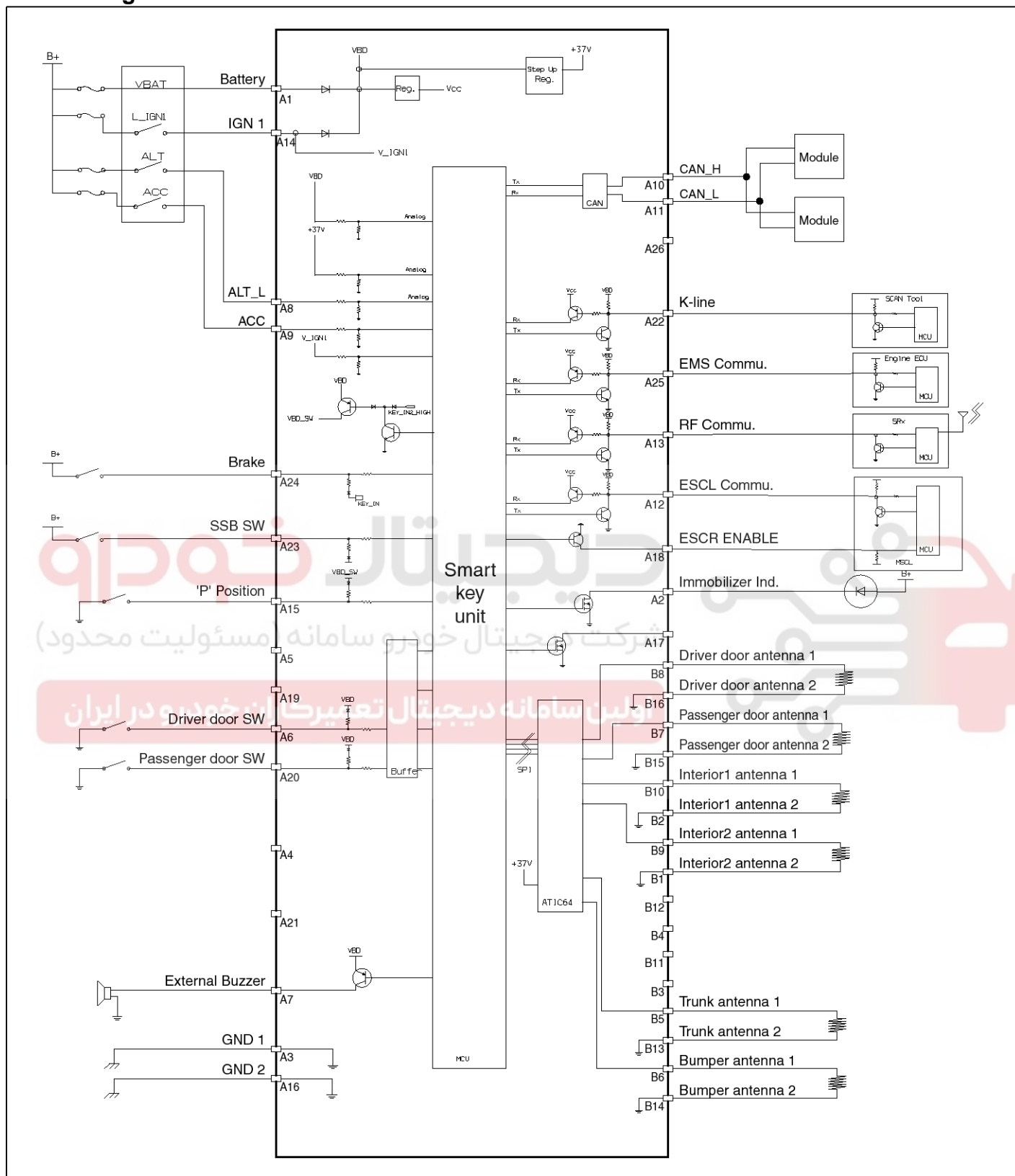
| NO. | Description (4Pins) |
|-----|---------------------|
| 1   | Data                |
| 2   | -                   |
| 3   | Power               |
| 4   | Ground              |

SVGBE0061L

# Smart key System

# BE-111

## Circuit Diagram



SVGBE0062L

# BE-112

# Body Electrical System

## Inspection

### Smart Key Unit

- Refer to the BE group - inspection / self diagnosis with GDS.

### Smart Key Switch

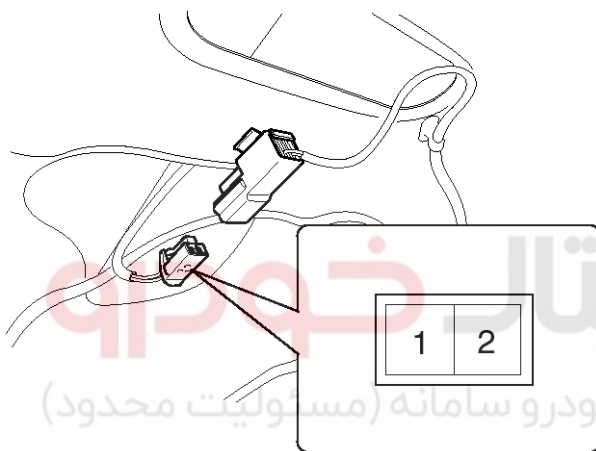
- Refer to the BE group - inspection / self diagnosis with GDS.

### Antenna

- Refer to the BE group - inspection / self diagnosis with GDS.

### Trunk Lid Open Switch

1. Check for continuity between the Trunk lid open switch terminals.



SVGBE0101D

2. If continuity is not specified, inspect the switch

| Terminal Position | 1     | 2     |
|-------------------|-------|-------|
| OFF               |       |       |
| ON                | ○ ——— | ○ ——— |

SYFBE0030L

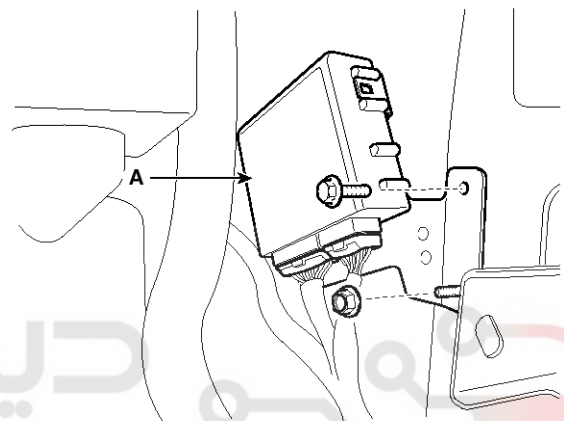
## Removal

### NOTICE

- Take care not to scratch the crash pad and related parts

### Smart key unit

1. Disconnect the negative (-) battery terminal.
2. Remove the glove box housing.  
(Refer to the BD group - "Crash pad")
3. Disconnect the smart key unit connector, and then remove the bracket and smart key unit (A) after loosening the bolt and nut.



SVGBE0089D

# Smart key System

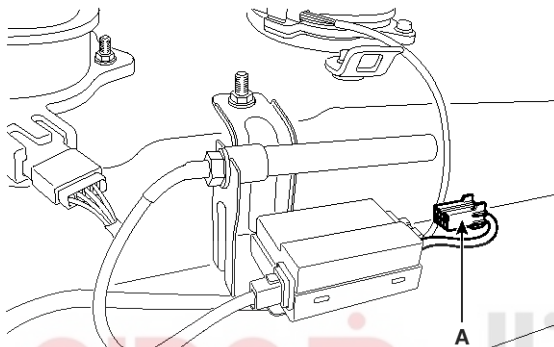
# BE-113

## RF Receiver

### NOTICE

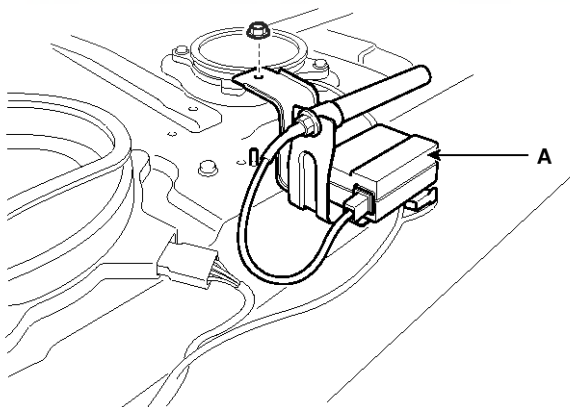
- Take care not to scratch the crash pad and related parts

1. Disconnect the negative(-) battery terminal.
2. Remove the rear seat.  
(Refer to the BD group - "Rear seat")
3. Remove the rear package tray.  
(Refer to the BD group - "Rear package tray")
4. Disconnect the RF receiver connector (A).



SVGBE0091D

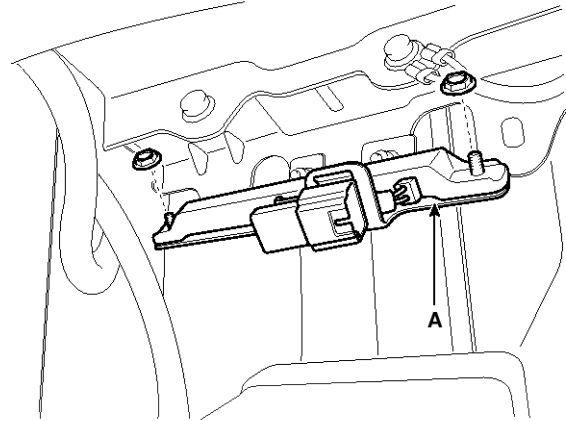
5. Remove the RF receive (A) after loosening the nut (1EA).



SVGBE0090D

## Interior 1 Antenna

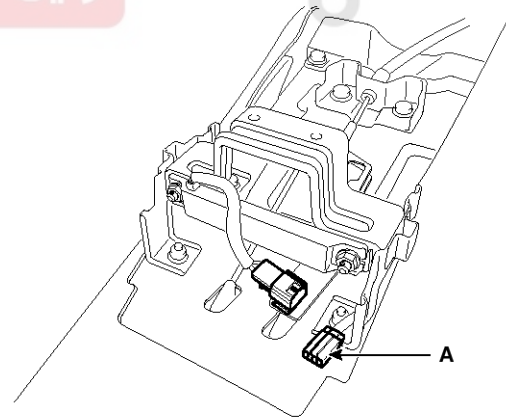
1. Disconnect the negative(-) battery terminal.
2. Remove the center console.  
(Refer to the BD group - "Console")
3. Remove the interior 1 antenna (A) after disconnecting the connector and loosening the mounting nuts (2EA).



SVGBE0092D

## Interior 2 Antenna

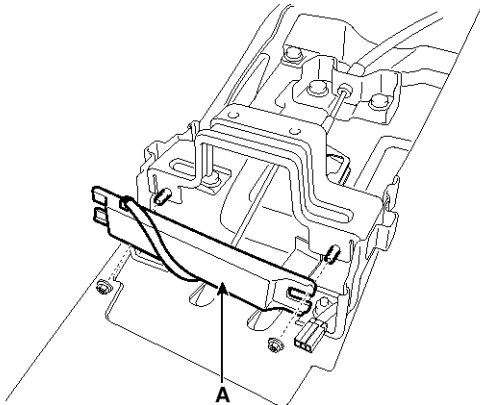
1. Disconnect the negative(-) battery terminal.
2. Remove the center console.  
(Refer to the BD group - "Console")
3. Disconnect the interior 2 antenna connector (A).



SVGBE0093D

## BE-114

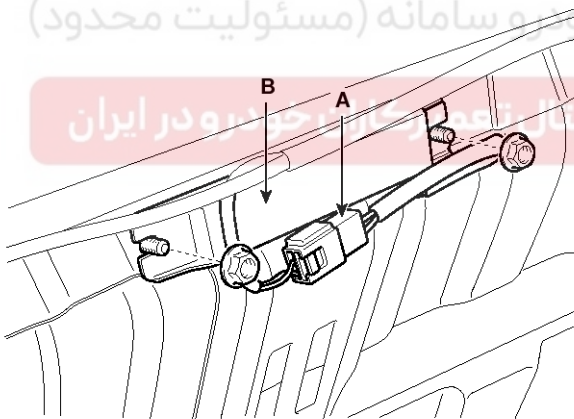
4. Remove the interior 1 antenna (A) after loosening the mounting nuts (2EA).



SVGBE0094D

## Trunk Antenna

1. Disconnect the negative(-) battery terminal.
2. Remove the trunk transverse trim.  
(Refer to the BD group - "Interior trim")
3. Disconnect the trunk antenna connector (A) and remove the trunk antenna (B) after loosening nut (2EA).

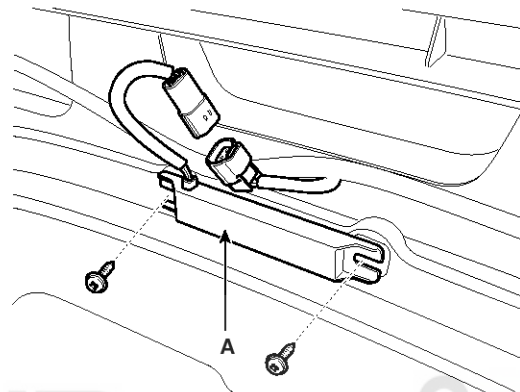


SVGBE0095D

## Body Electrical System

## Exterior Bumper Antenna

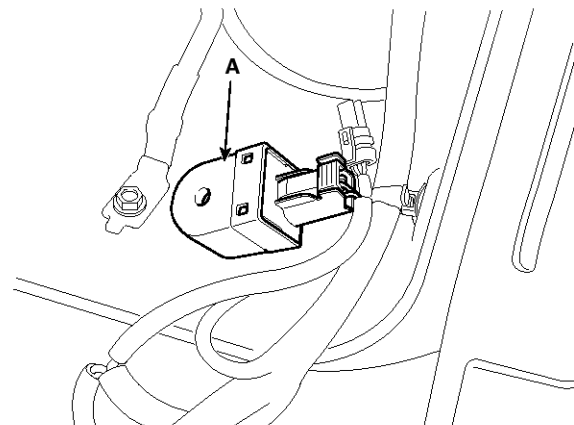
1. Disconnect the negative(-) battery terminal.
2. Remove the rear bumper.  
(Refer to the BD group - "Rear bumper")
3. Disconnect the exterior bumper antenna connector on rear bumper center part.
4. Disconnect the antenna connector and remove the exterior bumper antenna (A) after loosening the screws (2EA).



SVGBE0096D

## Buzzer

1. Disconnect the negative(-) battery terminal.
2. Remove the left side wheel guard.
3. Remove the external buzzer (A) after disconnecting the connector.



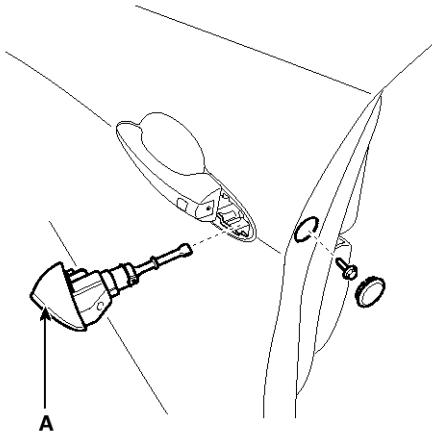
SYFBE0082D

# Smart key System

# BE-115

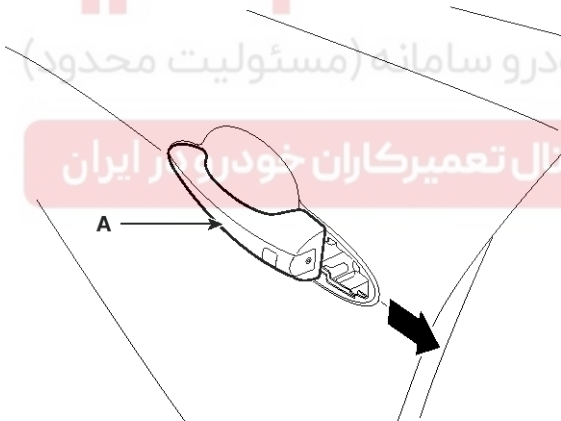
## Door Outside Handle

1. Disconnect the negative (-) battery terminal.
2. Disconnect the connector after removing the door trim. (Refer to the BD group - "Front door")
3. Loosen the mounting bolt, then remove the door handle cover and door lock (A).



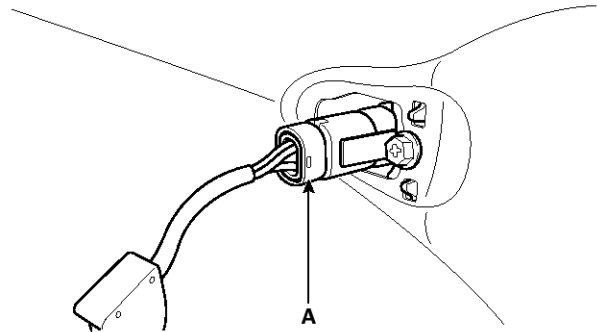
SVGBE0097D

4. Remove the outside handle (A) by sliding it rearward.



SVGBE0098D

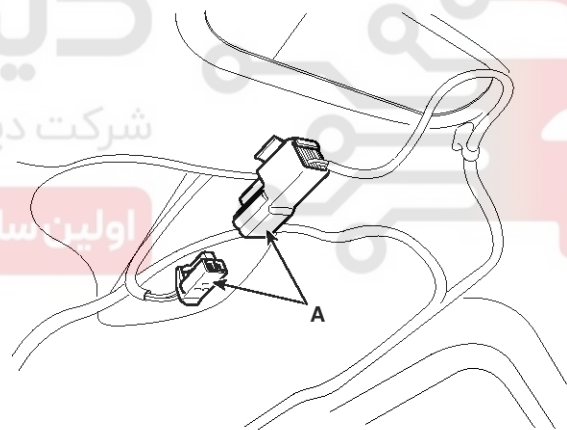
5. Disconnect the door outside handle connector (A).



SYFBE0085D

## Trunk lid open switch

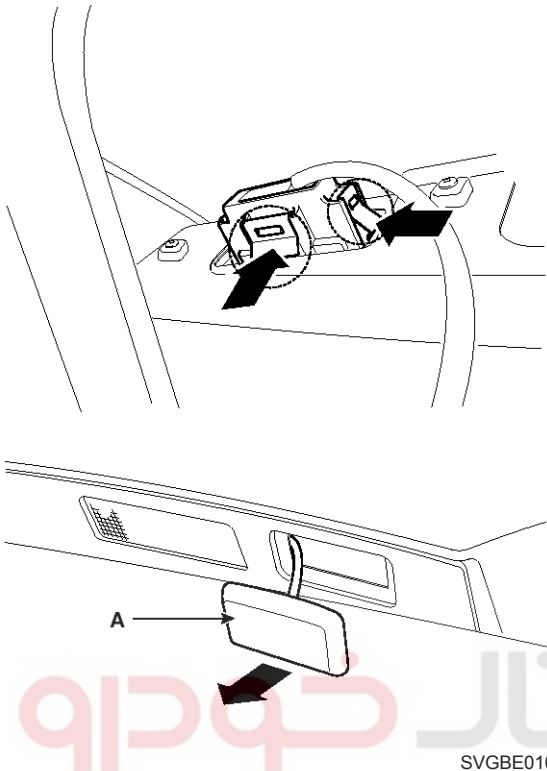
1. Disconnect the negative(-) battery terminal.
2. Remove the trunk door trim.  
(Refer to the BD group - "Trunk")
3. Disconnect the trunk lid open switch connector (A).



SVGBE0099D

**BE-116****Body Electrical System**

4. Remove the outside handle (A) after releasing the fixed hooks.

**Installation Smart Key Unit**

1. Install the smart key unit.
2. Install the smart key unit mounting nuts and screw and connector.
3. Install the glove box housing.
4. Install the negative (-) battery terminal and check the smart key system.

**RF Receiver**

1. Install the RF receiver.
2. Install the rear package tray.
3. Install the rear seat.
4. Install the negative (-) battery terminal and check the smart key system.

**Interior 1 Antenna**

1. Install the interior 1 antenna.
2. Install the center console.
3. Install the negative (-) battery terminal and check the smart key system.

**Interior 2 Antenna**

1. Install the interior 2 antenna.
2. Install the center console.
3. Install the negative (-) battery terminal and check the smart key system.

**Trunk Antenna**

1. Install the trunk antenna.
2. Install the trunk transverse trim.
3. Install the negative (-) battery terminal and check the smart key system.

**Exterior Bumper Antenna**

1. Install the exterior bumper antenna.
2. Install the rear bumper.
3. Install the negative (-) battery terminal and check the smart key system.

**Buzzer**

1. Install the buzzer.
2. Install the left side wheel guard.
3. Install the negative (-) battery terminal and check the smart key system.

**Trunk Lid Open Switch**

1. Install the trunk lid open switch.
2. Install the trunk lid open trim.
3. Install the negative (-) battery terminal and check the smart key system.

**Door Outside Handle**

1. Install the outside handle.
2. Install the door trim.
3. Install the negative (-) battery terminal and check the smart key system.



# Keyless Entry And Burglar Alarm

## BE-117

### Keyless Entry And Burglar Alarm

#### Specification

| Item                   | Description                                                                                                                                                                                                    |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power source           | 3V                                                                                                                                                                                                             |
| Operating temperature  | -20°C ~ +60°C                                                                                                                                                                                                  |
| RF Modulation          | FSK                                                                                                                                                                                                            |
| LF Modulation          | ASK                                                                                                                                                                                                            |
| RF frequency           | 433.92MHz                                                                                                                                                                                                      |
| Battery                | 1EA (CR2032)<br><b>⚠️WARNING</b><br><b>An inappropriately disposed battery can be harmful to the environment and human health.</b><br><b>Dispose the battery according to your local law(s) or regulation.</b> |
| Transmissible distance | 10m or more                                                                                                                                                                                                    |
| Button number          | 4                                                                                                                                                                                                              |
| Function               | Door lock                                                                                                                                                                                                      |
|                        | Door unlock                                                                                                                                                                                                    |
|                        | Trunk lid open                                                                                                                                                                                                 |
|                        | Panic                                                                                                                                                                                                          |

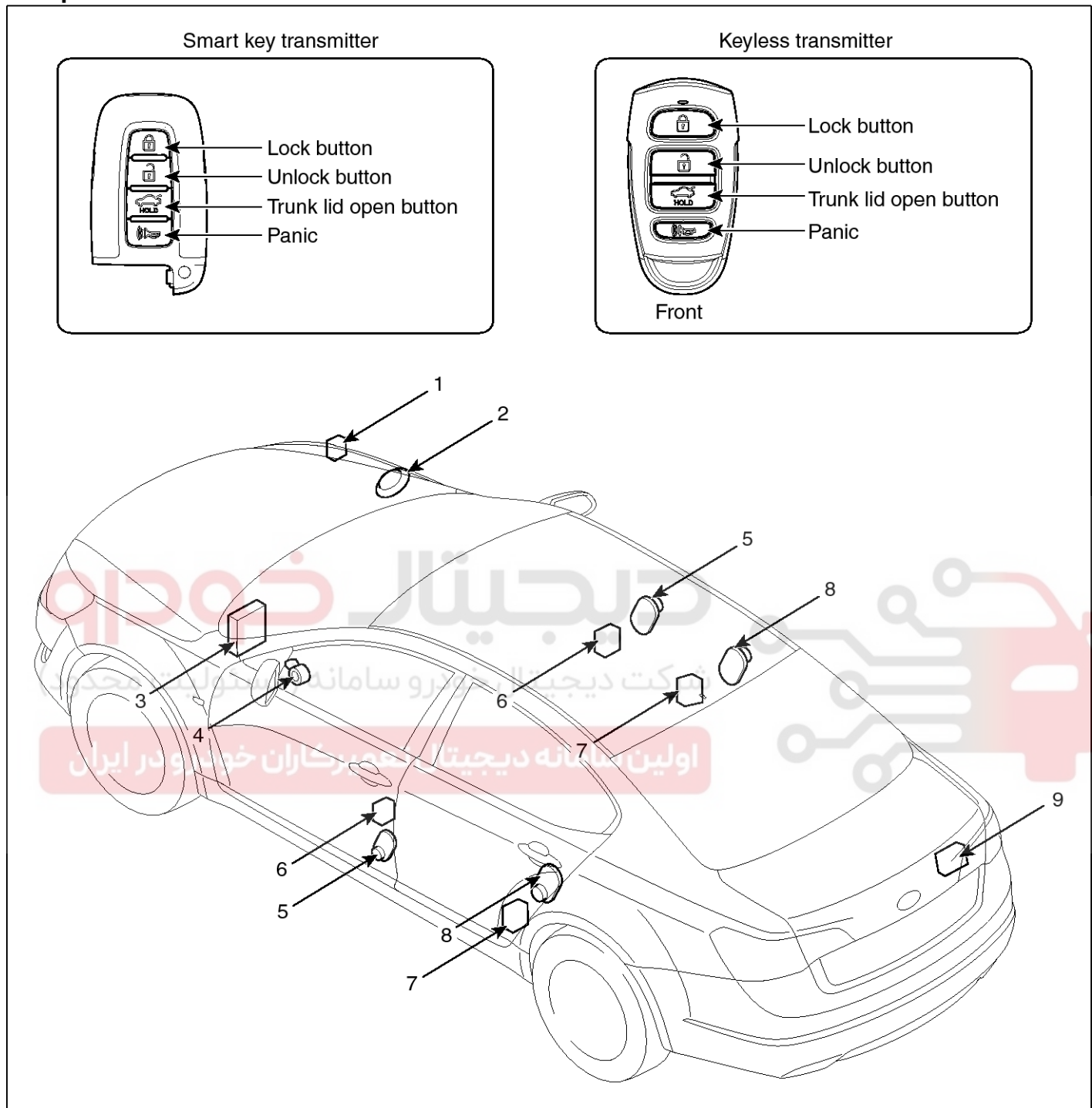
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

# BE-118

# Body Electrical System

## Component Location



SVGBE0063L

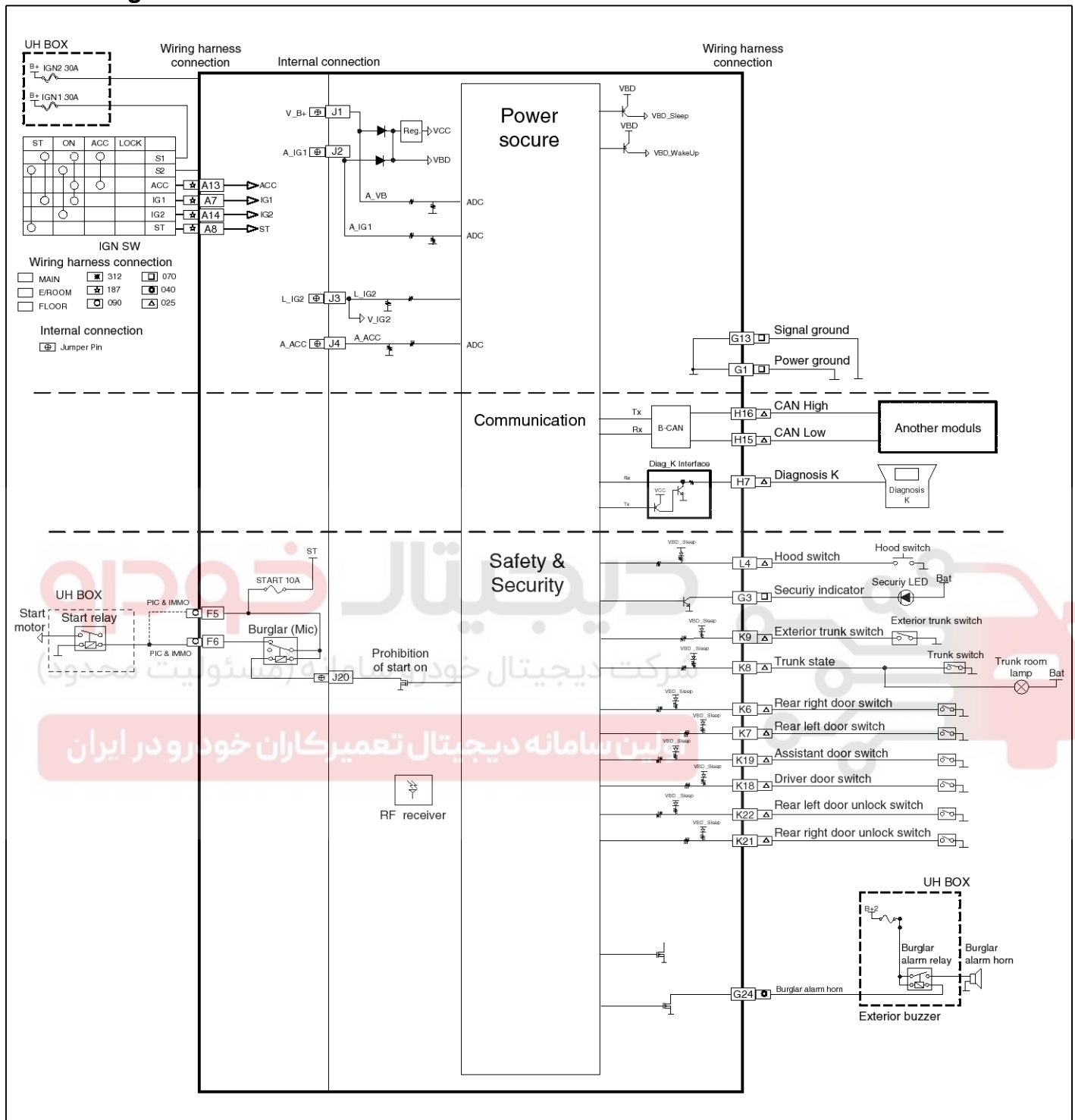
- 1. Hood switch
- 2. Burglar horn
- 3. IPM and RF antenna
- 4. Key warning switch
- 5. Front door switch

- 6. Front door lock actuator & switch
- 7. Rear door lock actuator & switch
- 8. Rear door switch
- 9. Trunk lid open switch

# Keyless Entry And Burglar Alarm

# BE-119

## Circuit Diagram



SVGBE0064L

# BE-120

# Body Electrical System

## Description

### Remote Keyless Entry System

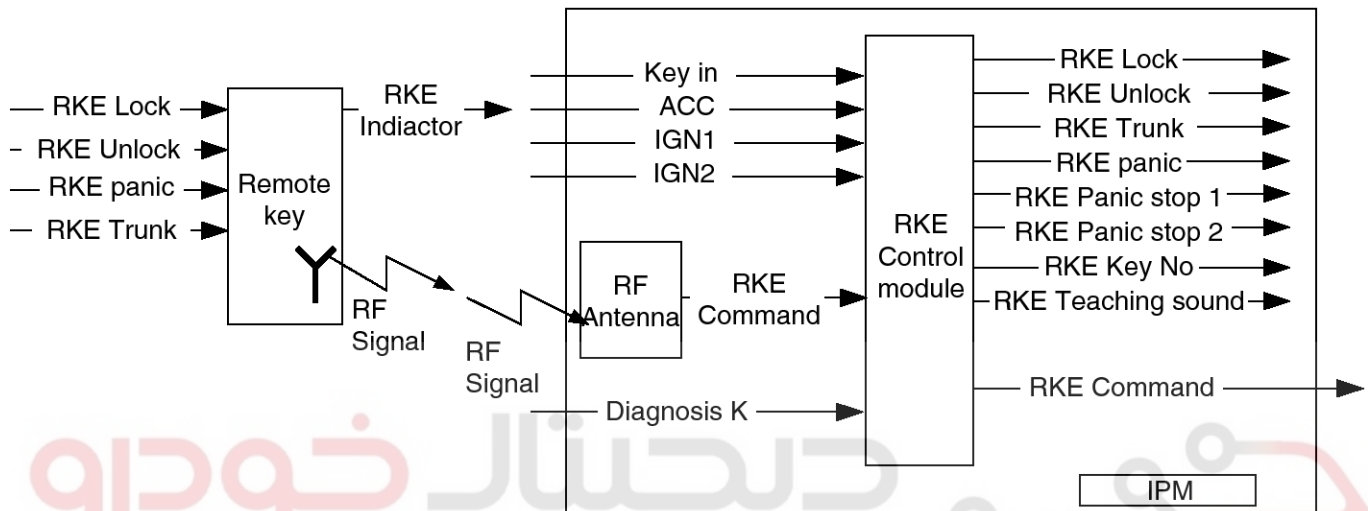
The described function is a radio-frequency remote control for central doors locking / unlocking, trunk release and Panic activity of an automotive vehicle without using a mechanical key.

This system confirms successful (un-)locking through flash light or/and a horn signal.

This will be a part of the equipment of vehicles in case of the Non-SMK variant.

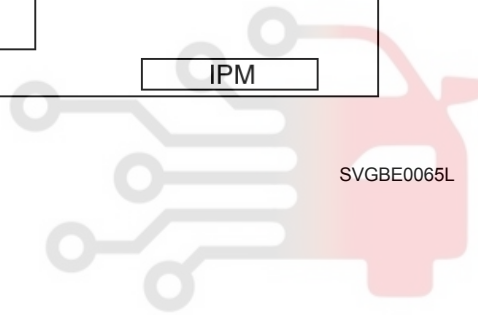
- Transmitter with 4 buttons (door locking, door unlocking, panic, and trunk release)
- Receiver is integrated in the IPM control unit
- IPM, control unit in which remote control decoding is done

### RF System Function Data Flow



دیجیتال خودرو  
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



SVGBE0065L

# Keyless Entry And Burglar Alarm

## BE-121

### Input / Output Interface

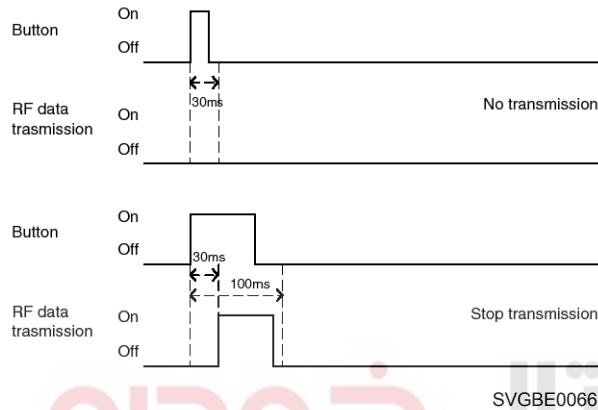
| Function       | Characteristics   | Name                                  |                                                                                                                                                                                                                                        |
|----------------|-------------------|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                   | Hardware Label                        | Spec. Designation                                                                                                                                                                                                                      |
| Input          | Logic             | Key In                                | Key In signal                                                                                                                                                                                                                          |
|                |                   | ACC                                   | Accessory Signal                                                                                                                                                                                                                       |
|                |                   | IGN2                                  | Ignition 2 Power                                                                                                                                                                                                                       |
|                |                   | RKE Lock                              | Door Lock Request by Remote Key                                                                                                                                                                                                        |
|                |                   | RKE Unlock                            | Door Unlock Request by Remote Key                                                                                                                                                                                                      |
|                |                   | RKE Trunk                             | Trunk Open Request by Remote Key                                                                                                                                                                                                       |
|                |                   | RKE Panic                             | Panic Request by Remote Key                                                                                                                                                                                                            |
|                | Analog            | IGN1                                  | Ignition 1 Power                                                                                                                                                                                                                       |
|                | Communication     | Diagnosis K                           | KWP 2000 Communication Interface                                                                                                                                                                                                       |
| PWM (internal) | RKE Command       | RKE Command from internal RF receiver |                                                                                                                                                                                                                                        |
| Output         | IPM Internal      | RKE Lock                              | Lock Request by RKE to other function of IPM                                                                                                                                                                                           |
|                |                   | RKE Unlock                            | Unlock Request by RKE to other function of IPM                                                                                                                                                                                         |
|                |                   | RKE Trunk                             | Trunk open Request by RKE to other function of IPM                                                                                                                                                                                     |
|                |                   | RKE Panic                             | Panic Start Request by RKE Panic button to other function of IPM                                                                                                                                                                       |
|                |                   | RKE Panic Stop1                       | Pre Panic Request by RKE (Panic button)                                                                                                                                                                                                |
|                |                   | RKE Panic Stop2                       | Pre Panic Request by RKE (Trunk button)                                                                                                                                                                                                |
|                |                   | RKE Key No                            | Number of Remote Key : 1~4                                                                                                                                                                                                             |
|                |                   | RKE Teaching Sound                    | When each RKE key's teaching is ended, this event is triggered.                                                                                                                                                                        |
|                | CAN Communication | RKE Command                           | RKE Command to other ECU<br>0 : None<br>1: Lock & No1 / 2: Unlock & No1<br>3: Lock & No2 / 4: Unlock & No2<br>5: Lock & No3 / 6: Unlock & No3<br>7: Lock & No4 / 8: Unlock & No4<br>9: Lock / 10: Unlock<br>*. No 1~4 : Fob Key number |

# BE-122

# Body Electrical System

## Key (button) Operation

1. New button event is detected in the condition of "button-off".
2. Chattering time of Lock/Unlock buttons is 100 ms and Trunk button have 1s chattering time and Panic button is 500ms.
3. If a button switch is off before determining the button switch value (100ms), RF transmission is stopped.
4. If more two buttons pressed simultaneously, older is rejected.



Key(button) Operation Abnormal Transmit Timing Chart

## Indicator (LED)

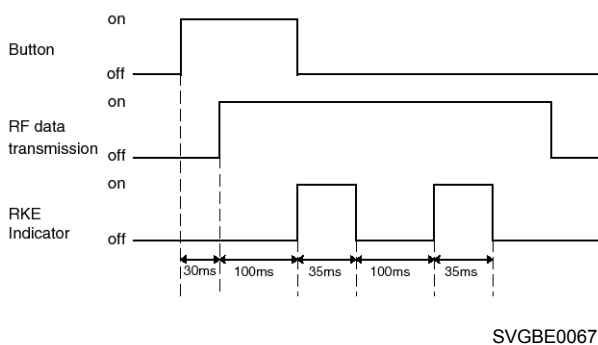
Each transmitter has a red LED on the housing top it indicates the transmission activity. The LED blinks same times with RF data First valid frame transmission times follow is "normal frame" case.

Normal frame cases are Lock frame, Unlock frame, Panic frame, Trunk frame. it is also valid case and first detection frame.

There is one exception to this rule, Panic Stop frame has to ignore for LED blinking.

If you want to know other cases, refer the figure in chapter for Validated Key (button) Input for Protection of Panic noise.

When RF Data is transmitted, the LED is blinked like below.



## Receiver & IPM Function

This function describes the following features

- RKE Lock
- RKE Unlock
- RKE Trunk Open
- RKE Panic
- RKE PanicStop1/ RKE PanicStop2
- Memory order by RKE Lock
- Key Teaching
- Synchronization / Resynchronization



# Keyless Entry And Burglar Alarm

## BE-123

### Key Teaching

Key Teaching is that IPM has the identification of remote key and Synchronization of rolling code between IPM and remote key

#### 1. Key Teaching with GDS Diagnostic Tool

- Key teaching Step refers to the Diagnostic Specification.

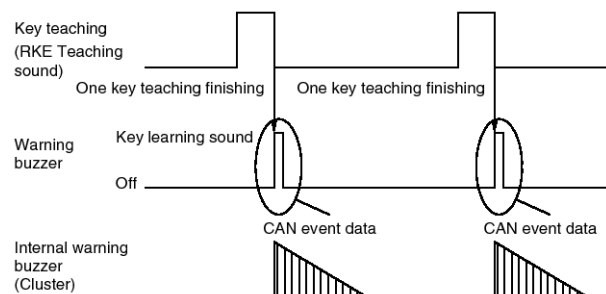
| Step | User Action                                                                            | IPM Action                                                                                                                                                                           |
|------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Connect Diag-Tool to IPM                                                               |                                                                                                                                                                                      |
| 2    | Start Diag-Tool RKE Teaching Mode                                                      | IPM ready RKE Teaching                                                                                                                                                               |
| 3    | Press the RKE's any Button                                                             | <ul style="list-style-type: none"> <li>- IPM Save the issue RKE's ID Code and Rolling Code.</li> <li>- If RKE Teaching succeeds, IPM sounds the internal buzzer one time.</li> </ul> |
| 4    | If user wants teach additional RKE, enter the Diag-Tool's additional RKE Teaching Mode | IPM ready RKE Teaching                                                                                                                                                               |
| 5    | Press the RKE's any Button                                                             | <ul style="list-style-type: none"> <li>- IPM Save the issue RKE's ID Code and Rolling Code.</li> <li>- If RKE Teaching succeeds, IPM sounds the internal buzzer one time.</li> </ul> |
| 6    | If user wants teach additional RKE, repeat step4,5                                     | Maximum 4 RKE's Teaching is Possible.                                                                                                                                                |
| 7    | If user doesn't want teach RKE, enter the Diag-Tool's Stop RKE Teaching Mode           | IPM terminate RKE Teaching mode.                                                                                                                                                     |

#### 2. Key Teaching Sound

Only for information: (RKE teaching sound is described in Warning function specification)

- When each Key's teaching is ended, magnetic buzzer is operated, every one time.
- Key Teaching Buzzer Sound Characteristics

| Type                                          | Magnetic Buzzer |
|-----------------------------------------------|-----------------|
| Key Teaching Buzzer Sound frequency :         | 800 Hz          |
| Key Teaching Buzzer Sound Signal Duty Ratio : | 50% Duty        |
| Key Teaching Buzzer Sound Period :            | 0.6 sec         |
| Key Teaching Buzzer Sound duration :          | 0.6 sec         |



SVGBE0068L



## BE-124

## Body Electrical System

### Burglar Alarm System

- The Burglar Alarm System is a function used to prevent or deter the unauthorized appropriation of the vehicle. Theft prevention or Burglar Alarm function has been introduced to assert the ownership whenever the rightful owner is physically present. In an attempt to discourage theft, Burglar Alarm works by emitting high-volume sound (Horn) when triggered by circuit breach. This vehicle alarm is designed to be triggered by opening special switches (e.g. doors, hood, trunk open switch contacts)
- This system also prevents the car from starting by disabling Starter relay if intrusion has been detected.
- To indicate that the vehicle is anti-theft protected a blinking indicator located at a visible area in the vehicle is provided (this is part of a theft preventive action).

The Alarm System function group consists of an Burglar Alarm function.

The BurglarAlarm offers a theft protection functions which

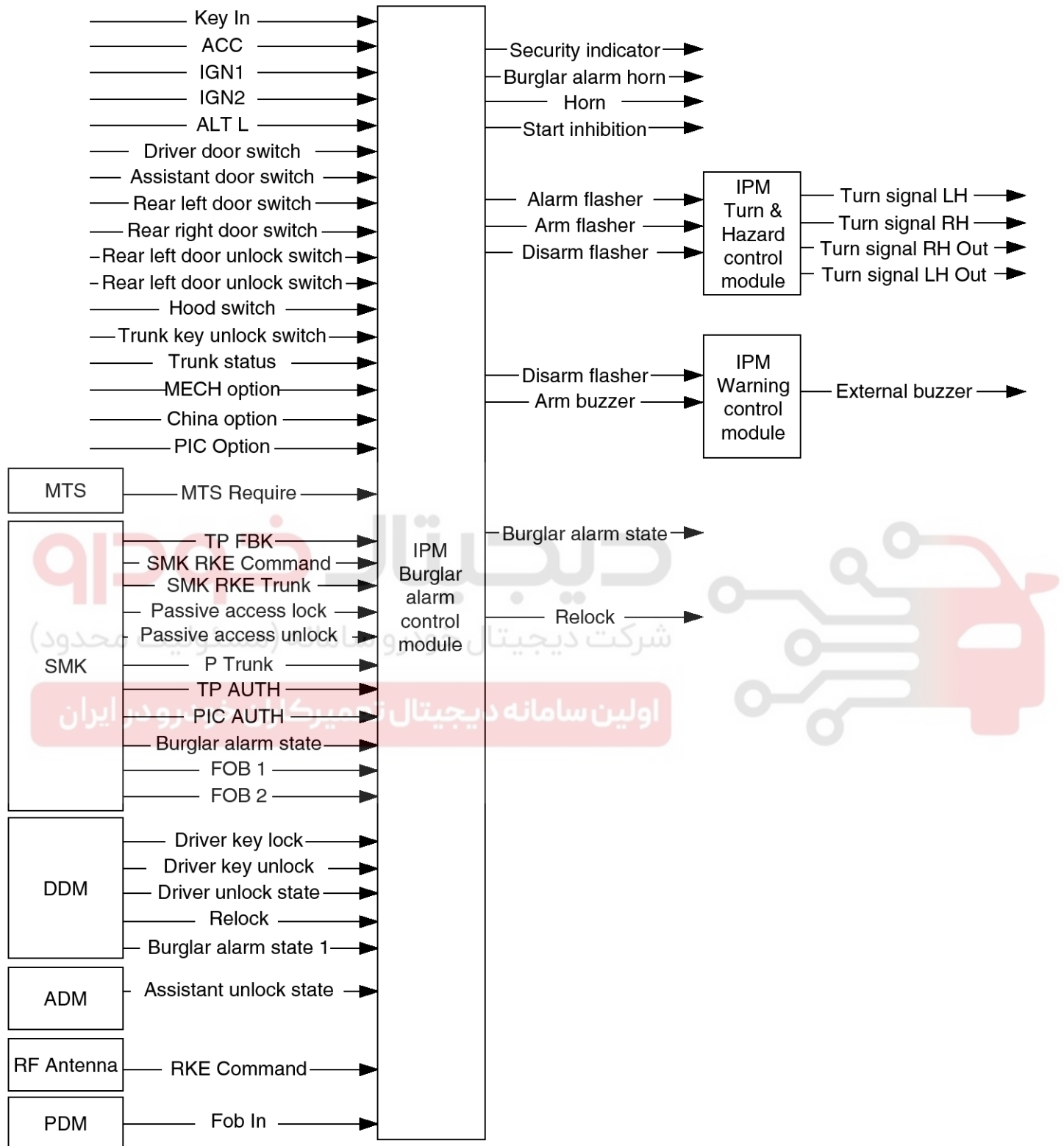
1. Armed by
  - Mechanical key lock switch in driver side door if Mechanical Option is set
  - By RKE lock or SMK lock command
  - All door lock and then all door closed if Mechanical Option is set
2. Triggers an alarm when
  - Any doors open
  - Hood open
  - Trunk open by unknown event
3. Disarmed by
  - Turning the mechanical key unlock switch in driver side door if Mechanical Option is set
  - By RKE unlock or SMK unlock command



# Keyless Entry And Burglar Alarm

## BE-125

### Burglar Alarm Function Data Flow



SVGBE0069L

## BE-126

## Body Electrical System

**Burglar Alarm Control Function**

This function specification describes the following states of Burglar Alarm Control

- ARM Mode
- DISARM Mode
- ARMWAIT Mode

- ALARM Mode
- ARMHOLD Mode
- AutoLockTimer1 Mode
- AutoLockTimer2 Mode
- PREARM Mode

| No | Pre-condition                                       | Event                      | Result                        | Remark                                             |
|----|-----------------------------------------------------|----------------------------|-------------------------------|----------------------------------------------------|
| 1  | All Entrances Closed                                | All kind of Lock           | ARM Flash ARM Buzzer          | Stay ARMWAIT mode during 30 sec and go to ARM mode |
| 2  | All Entrances Closed                                | All kind of Unlock         | DISARM Flash<br>DISARM Buzzer |                                                    |
| 3  | Any Entrance Opened                                 |                            |                               |                                                    |
| 4  | All Entrances Closed, After Lock Trunk or Hood Open | Trunk or Hood Open → Close | ARM Flash                     |                                                    |
| 5  |                                                     | Any Door Unlock            |                               |                                                    |
| 6  | Any Door Open, Trunk or Hood Open                   | RKE Unlock                 | DISARM Flash<br>DISARM Buzzer |                                                    |
| 7  |                                                     | MTS, Passive Unlock        | DISARM Flash                  |                                                    |
| 8  | ARM mode                                            | Any Entrance Opened        | ALARM Flash<br>ALARM Buzzer   |                                                    |

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

# Keyless Entry And Burglar Alarm

## BE-127

### Function Description

#### Signal Activity

The Burglar Alarm(BA) System provides the function that shall inhibit the use of the vehicle when intrusion into the vehicle has been detected.

- Burglar Alarm State1 is managed by the Burglar Alarm Control function, and is dependant on Burglar Alarm Control state as follows :
  - Burglar Alarm State1 = 1: Burglar Alarm Control state is in ARM or ALARM or REARM or ARM HOLD or ARMWAIT
  - Burglar Alarm State1 = 0: Burglar Alarm Control state is in DISARM or AUTO LOCK TIMER1 or AUTO LOCK TIMER2 or PREARM
- Burglar Alarm State is managed by the Burglar Alarm Control function for PDM, SMK, and is dependant on Burglar Alarm Control state as follows :
  - Burglar Alarm State = 1: Burglar Alarm Control state is in ARM or ALARM or REARM or ARM HOLD or ARMWAIT
  - Burglar Alarm State = 0: Burglar Alarm Control state is in DISARM or AUTO LOCK TIMER1 or AUTO LOCK TIMER2 or PREARM

- At the time of sending on the CAN signal to ARM type state from DISARM type state, the IPM unit shall send the CAN signals FOB1 and FOB2 set versus the memorized Key fob ID number (i.e.: Fob1, Fob2).
  - If Fob1 is set sending FOB1 = 1 otherwise FOB1 =0
  - If Fob2 is set sending FOB2 = 1 otherwise FOB2 =0
- To make available to other internal IPM functions the current Burglar Alarm Control state BAlarm State is updated each time the Burglar Alarm Control is changed of state.

#### Power Condition Activity

State by RESET Condition

| Present State  | After Reset | Action by Reset |
|----------------|-------------|-----------------|
| DISARM         | DISARM      | No Action       |
| ARMWAIT        | ARMWAIT     | No Action       |
| ARM            | ARM         | No Action       |
| ALARM          | ALARM       | Alarm Flashing  |
| REARM          | ALARM       | Alarm Flashing  |
| ARMHOLD        | ARMHOLD     | No Action       |
| PREARM         | DISARM      | No Action       |
| AUTOLOCKTIMER1 | DISARM      | No Action       |
| AUTOLOCKTIMER2 | DISARM      | No Action       |

- Reset means battery input restarted.
- Only in ALARM State or REARM State, when reset is occurred, it is retried Alarm Flashing.
- After reset, All timers should be reset.

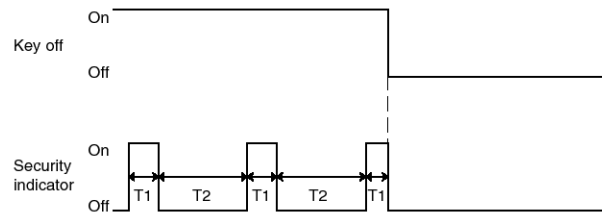
# BE-128

# Body Electrical System

## State Description

### DISARM

- In case of Key Out (Key Off ) Security IND is Blinking (0.32sec/On: 2sec/Off), and otherwise Security indicator is Off.



SVGBE0070L

T1 : 0.32 ± 0.032 sec, T2 : 2 ± 0.2 sec

1. DISARM to DISARM

### Condition 1

| State             | Description                                                                                                                                                              |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>DISARM STATE</li> <li>Key Out state(Key Off )</li> <li>Any Door is Open(Any Door Open On)</li> </ul>                              |
| Event             | Unlock by RKE(RKE Unlock Off → On)                                                                                                                                       |
| Action            | <ul style="list-style-type: none"> <li>DISARM Flashing(Disarm Flasher On)</li> <li>DISARM Buzzer Activation(Disarm Buzzer On)</li> <li>State does not changed</li> </ul> |

### Condition 2

| State             | Description                                                                                                                                                              |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>DISARM STATE</li> <li>Any Door is Open (Any Door Open On)</li> </ul>                                                              |
| Event             | Unlock by SMK(Passive Access Unlock Off→ On)                                                                                                                             |
| Action            | <ul style="list-style-type: none"> <li>DISARM Flashing(Disarm Flasher On)</li> <li>DISARM Buzzer Activation(Disarm Buzzer On)</li> <li>State does not changed</li> </ul> |

### Condition 3

| State             | Description                                                                                                              |
|-------------------|--------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>DISARM STATE</li> </ul>                                                           |
| Event             | Key On state (Key On)                                                                                                    |
| Action            | <ul style="list-style-type: none"> <li>Security IND is Off(Security IND Off).</li> <li>State does not changed</li> </ul> |

### Condition 4

| State             | Description                                                                                                                                              |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>DISARM STATE</li> </ul>                                                                                           |
| Event             | Key Off state (Key Off On)                                                                                                                               |
| Action            | <ul style="list-style-type: none"> <li>Security IND is Blinking (Security IND Blinking; 0.32sec:On/2sec:Off).</li> <li>State does not changed</li> </ul> |

# Keyless Entry And Burglar Alarm

## BE-129

### 2. ARMWAIT to DISARM

#### Condition 1

| State             | Description                                                                                                                                                                                                                                                                           |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ARMWAIT STATE</li> </ul>                                                                                                                                                                                                                       |
| Event             | <ol style="list-style-type: none"> <li>Key In (Key In On) or</li> <li>Fob In (Fob In On) or</li> <li>Any Door is Open(Any Door Open On) or</li> <li>Hood is Open(Hood SW On) or</li> <li>Trunk is Open(Trunk Status On) or</li> <li>Any Door is Unlock(Any Door Unlock On)</li> </ol> |
| Action            | <ul style="list-style-type: none"> <li>State go to DISARM State</li> </ul>                                                                                                                                                                                                            |

#### Condition 2

| State             | Description                                                                                                                      |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ARMWAIT STATE</li> <li>Mechanical key ARM/DISARM Option is enable(MECH Opt On)</li> </ul> |
| Event             | Unlock by Mechanical Key(DRV Key Unlock Off → On)                                                                                |
| Action            | <ul style="list-style-type: none"> <li>State go to DISARM State</li> </ul>                                                       |

#### Condition 3

| State             | Description                                                                                                                                                                                               |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ARMWAIT STATE</li> </ul>                                                                                                                                           |
| Event             | <ol style="list-style-type: none"> <li>Authenticate by Immobilizer System(TP_AUTH On) or</li> <li>Authenticate by SMK (PIC_AUTH On) or</li> <li>Pre-Authenticate by valid Fob (TP FeedBack On)</li> </ol> |
| Action            | <ul style="list-style-type: none"> <li>State go to DISARM State</li> </ul>                                                                                                                                |

### 3. ARM to DISARM

#### Condition 1

| State             | Description                                                                                                                                                                                               |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ARM STATE</li> </ul>                                                                                                                                               |
| Event             | <ol style="list-style-type: none"> <li>Authenticate by Immobilizer System(TP AUTH On) or</li> <li>Authenticate by SMK (PIC AUTH On) or</li> <li>Pre-Authenticate by valid Fob (TP FeedBack On)</li> </ol> |
| Action            | <ul style="list-style-type: none"> <li>State go to DISARM State</li> </ul>                                                                                                                                |

#### Condition 2

| State             | Description                                                                                             |
|-------------------|---------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ARM STATE</li> <li>No China Option (China Option Off)</li> </ul> |
| Event             | Key In and IGN1 On and IGN2 On(Key IGN On)                                                              |
| Action            | <ul style="list-style-type: none"> <li>State go to DISARM State</li> </ul>                              |

**BE-130****Body Electrical System****Condition 3**

| State             | Description                                                                                                                  |
|-------------------|------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ARM STATE</li> <li>Mechanical key ARM/DISARM Option is enable(MECH Opt On)</li> </ul> |
| Event             | Unlock by Mechanical Key (DRV Key Unlock Off → On)                                                                           |
| Action            | <ul style="list-style-type: none"> <li>State go to DISARM State</li> </ul>                                                   |

4. ARM HOLD to DISARM

**Condition 1**

| State             | Description                                                                                                                                                                                               |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ARMHOLD STATE</li> </ul>                                                                                                                                           |
| Event             | <ol style="list-style-type: none"> <li>Authenticate by Immobilizer System(TP AUTH On) or</li> <li>Authenticate by SMK (PIC AUTH On) or</li> <li>Pre-Authenticate by valid Fob (TP FeedBack On)</li> </ol> |
| Action            | <ul style="list-style-type: none"> <li>State go to DISARM State</li> </ul>                                                                                                                                |

**Condition 2**

| State             | Description                                                                                                 |
|-------------------|-------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ARMHOLD STATE</li> <li>No China Option (China Option Off)</li> </ul> |
| Event             | Key In and IGN1 On and IGN2 On(Key IGN On)                                                                  |
| Action            | <ul style="list-style-type: none"> <li>State go to DISARM State</li> </ul>                                  |

**Condition 3**

| State             | Description                                                                                                                      |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ARMHOLD STATE</li> <li>Mechanical key ARM/DISARM Option is enable(MECH Opt On)</li> </ul> |
| Event             | Unlock by Mechanical Key (DRV Key Unlock Off → On)                                                                               |
| Action            | <ul style="list-style-type: none"> <li>State go to DISARM State</li> </ul>                                                       |



# Keyless Entry And Burglar Alarm

## BE-131

### 5. AUTO LOCK TIMER1 to DISARM

#### Condition 1

| State             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>AUTOLOCKTIMER1 STATE</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Event             | <ol style="list-style-type: none"> <li>Key In(Key In On) or</li> <li>Fob In (Fob In On) or</li> <li>Any Door is Open(Any Door Open On) or</li> <li>Hood is Open(Hood SW On) or</li> <li>Trunk is Open(Trunk Status On) or</li> <li>Authenticate by Immobilizer System(TP AUTH On) or</li> <li>Authenticate by SMK (PIC AUTH On) or</li> <li>Pre-Authenticate by valid Fob (TP FeedBack On) or</li> <li>Lock by RKE/SMK/AutoLock/Mechanical key with option mechanical set but locking failed ( Lock Confirm Fail Off → On)</li> </ol> |
| Action            | <ul style="list-style-type: none"> <li>State go to DISARM State</li> <li>Auto Lock Off</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                     |

### 6. AUTO LOCK TIMER2 to DISARM

#### Condition 1

| State             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>AUTOLOCKTIMER2 STATE</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Event             | <ol style="list-style-type: none"> <li>Key In On(Key In On) or</li> <li>Fob In (Fob In On) or</li> <li>Any Door is Open(Any Door Open On) or</li> <li>Hood is Open(Hood SW On &amp;&amp; Hood Open Off) or</li> <li>Trunk is Open(Trunk Status On &amp;&amp; Trunk Open Off) or</li> <li>Authenticate by Immobilizer System(TP AUTH On) or</li> <li>Authenticate by SMK (PIC AUTH On) or</li> <li>Pre-Authenticate by valid Fob (TP FeedBack On) or</li> <li>Lock by RKE/SMK/AutoLock/Mechanical key with option mechanical set but locking failed (Lock Confirm Fail Off → On)</li> </ol> |
| Action            | <ul style="list-style-type: none"> <li>Hood Open Off</li> <li>Trunk Open Off</li> <li>Auto Lock Off</li> <li>State go to DISARM State</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                           |

**BE-132****Body Electrical System**

## 7. PREARM to DISARM

**Condition 1**

| State             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>PREARM STATE</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                  |
| Event             | <ol style="list-style-type: none"> <li>Key In On(Key In On) or</li> <li>Fob In (Fob In On) or</li> <li>Authenticate by Immobilizer System(TP AUTH On) or</li> <li>Authenticate by SMK (PIC AUTH On) or</li> <li>Pre-Authenticate by valid Fob (TP FeedBack On) or</li> <li>All Doors are Close (All Doors Close On) and Hood is Close (Hood SW Off) and Trunk is Close(Trunk Status Off) and Any Door is Unlock (Any Door Unlock On)</li> </ol> |
| Action            | <ul style="list-style-type: none"> <li>State go to DISARM State</li> </ul>                                                                                                                                                                                                                                                                                                                                                                      |

**Condition 2**

| State             | Description                                                                                                                                                                |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>PREARM STATE</li> <li>Any Door is Open(Any Door Open On)</li> </ul>                                                                 |
| Event             | <ol style="list-style-type: none"> <li>Unlock by SMK(Passive Access Unlock Off → On) or</li> <li>Unlock by RKE(RKE Unlock Off → On)</li> </ol>                             |
| Action            | <ul style="list-style-type: none"> <li>DISARM Flashing(Disarm Flasher On)</li> <li>DISARM Buzzer Activation(Disarm Buzzer On)</li> <li>State go to DISARM State</li> </ul> |

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# Keyless Entry And Burglar Alarm

## BE-133

### 8. REARM to DISARM

#### Condition 1

| State             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>REARM STATE</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Event             | <ol style="list-style-type: none"> <li>Trunk release by RKE(RKE Trunk Off → On) or</li> <li>Trunk release by SMK (P TRUNK Off → On) or</li> <li>Lock by RKE/SMK but Locking is Failed ( Lock Confirm Fail Off → On) or</li> <li>Authenticate by Immobilizer System(TP AUTH On) or</li> <li>Authenticate by SMK (PIC AUTH On) or</li> <li>Alternator Input Level is High during 3sec (Alt L Alarm Release On) or</li> <li>Pre-Authenticate by valid Fob (TP FeedBack On)</li> </ol> |
| Action            | <ul style="list-style-type: none"> <li>Engine Start Inhibition state is released (Start Inhibition Off)</li> <li>State go to DISARM State</li> </ul>                                                                                                                                                                                                                                                                                                                               |

#### Condition 2

| State             | Description                                                                                                                                          |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>REARM STATE at Non China Option (China Option Off)</li> </ul>                                                 |
| Event             | Key In On and IGN1 On and IGN2 On during 30sec ( Key IGN Alarm Release On)                                                                           |
| Action            | <ul style="list-style-type: none"> <li>Engine Start Inhibition state is released (Start Inhibition Off)</li> <li>State go to DISARM State</li> </ul> |

#### Condition 3

| State             | Description                                                                                                                                                                                                                                                        |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>REARM STATE</li> <li>Mechanical key ARM/DISARM Option is enable(MECH Opt On)</li> </ul>                                                                                                                                     |
| Event             | <ol style="list-style-type: none"> <li>Unlock by Mechanical Key (DRV Key Unlock Off → On) or</li> <li>Lock by Mechanical Key but Locking is Failed(Lock Confirm Fail Off→On) or</li> <li>Trunk Release by Mechanical Key (Trunk Key Unlock SW Off → On)</li> </ol> |
| Action            | <ul style="list-style-type: none"> <li>Engine Start Inhibition state is released (Start Inhibition Off)</li> <li>State go to DISARM State</li> </ul>                                                                                                               |

**BE-134****Body Electrical System**

## 9. ALARM to DISARM

**Condition 1**

| State             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ALARM STATE</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Event             | <ol style="list-style-type: none"> <li>Trunk release by RKE(RKE Trunk Off → On) or</li> <li>Trunk release by SMK(P TRUNK Off → On) or</li> <li>Lock by RKE/SMK but Locking is Failed (Lock Confirm Fail Off → On) or</li> <li>Authenticate by Immobilizer System(TP AUTH On) or</li> <li>Authenticate by SMK (PIC AUTH On) or</li> <li>Pre-Authenticate by valid Fob (TP FeedBack On) or</li> <li>Alternator Input Level is High(Alt L On) during 3sec (Alt L Alarm Release On)</li> </ol> |
| Action            | <ul style="list-style-type: none"> <li>Stop alarm flashing (Alarm Flasher Off)</li> <li>Stop Burglar Alarm Horn(Burglar Alarm Horn Off/ Horn Off)</li> <li>Engine Start Inhibition state is released (Start Inhibition Off)</li> <li>State go to DISARM State</li> </ul>                                                                                                                                                                                                                   |

**Condition 2**

| State             | Description                                                                                                                                                                                                                                                              |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ALARM STATE at Non China Option(China Option Off)</li> </ul>                                                                                                                                                                      |
| Event             | Key In and IGN1 On and IGN2 On during 30sec ( Key IGN Alarm Release On)                                                                                                                                                                                                  |
| Action            | <ul style="list-style-type: none"> <li>Stop alarm flashing (Alarm Flasher Off)</li> <li>Stop Burglar Alarm Horn(Burglar Alarm Horn Off/ Horn Off)</li> <li>Engine Start Inhibition state is released (Start Inhibition Off)</li> <li>State go to DISARM State</li> </ul> |

**Condition 3**

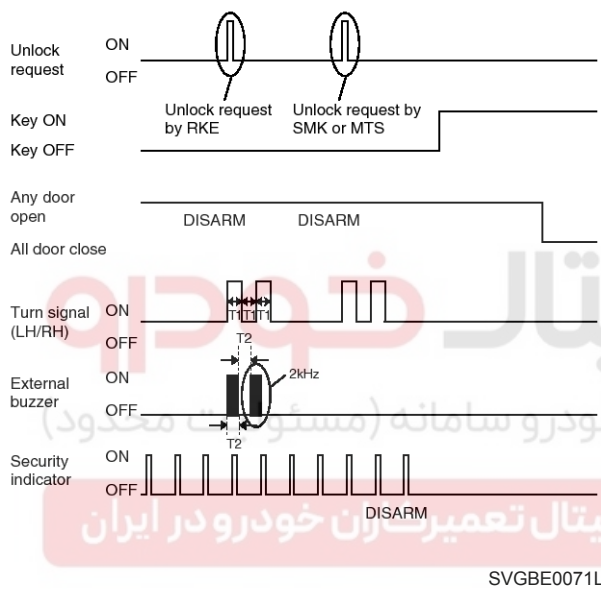
| State             | Description                                                                                                                                                                                                                                                              |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ALARM STATE</li> <li>Mechanical key ARM/DISARM Option is enable(MECH Opt On)</li> </ul>                                                                                                                                           |
| Event             | <ol style="list-style-type: none"> <li>Unlock by Mechanical Key (DRV Key Unlock Off → On) or</li> <li>Trunk release by Mechanical Key(Trunk Key Unlock SW Off → On) or</li> <li>Lock by Mechanical Key but Locking is Failed(Lock Confirm Fail Off → On)</li> </ol>      |
| Action            | <ul style="list-style-type: none"> <li>Stop alarm flashing (Alarm Flasher Off)</li> <li>Stop Burglar Alarm Horn(Burglar Alarm Horn Off/ Horn Off)</li> <li>Engine Start Inhibition state is released (Start Inhibition Off)</li> <li>State go to DISARM State</li> </ul> |

# Keyless Entry And Burglar Alarm

# BE-135

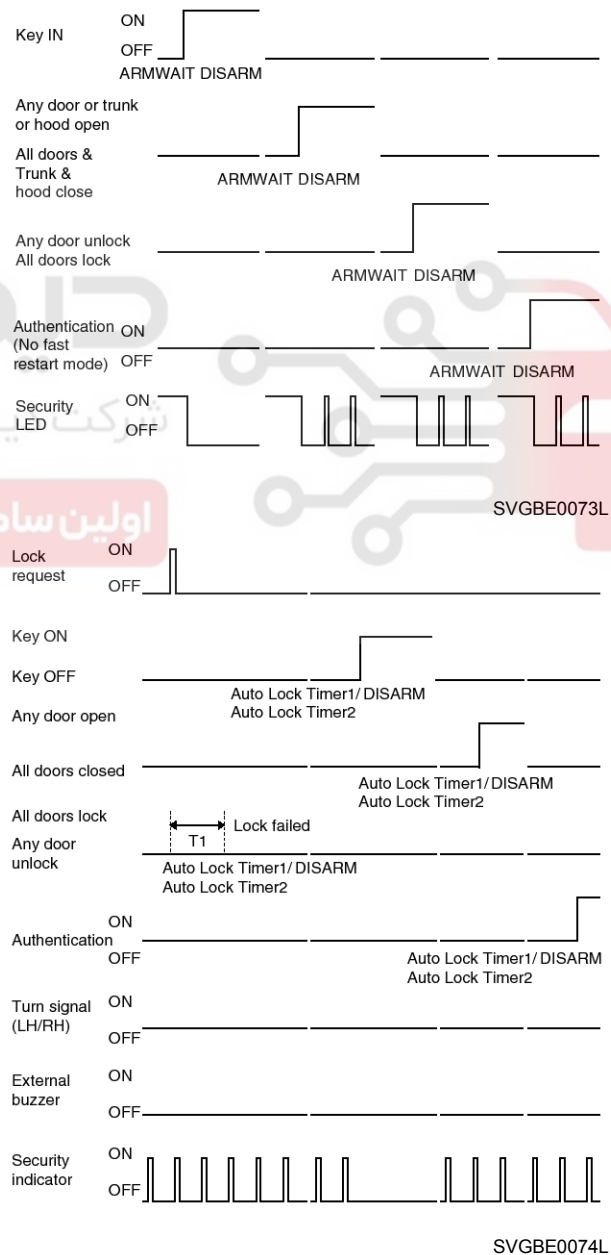
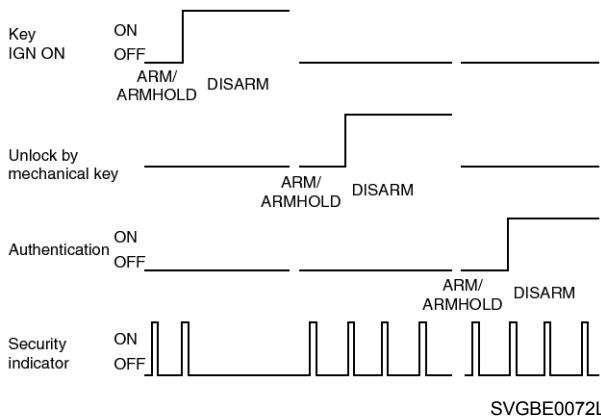
## Condition 4

| State             | Description                                                                                                                                                                                                                                                                                                                                                              |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ALARM STATE</li> <li>Any Door is Open(Any Door Open On)</li> </ul>                                                                                                                                                                                                                                                                |
| Event             | <ol style="list-style-type: none"> <li>Unlock by SMK(Passive Access Unlock Off → On) or</li> <li>Unlock by RKE (RKE Unlock Off → On)</li> </ol>                                                                                                                                                                                                                          |
| Action            | <ul style="list-style-type: none"> <li>DISARM Flashing(Disarm Flasher On)</li> <li>DISARM Buzzer Activation(Disarm Buzzer On)</li> <li>Stop alarm flashing (Alarm Flasher Off)</li> <li>Stop Burglar Alarm Horn(Burglar Alarm Horn Off/ Horn Off)</li> <li>Engine Start Inhibition state is released (Start Inhibition Off)</li> <li>State go to DISARM State</li> </ul> |



T1 : 0.5 ± 0.05 Sec,

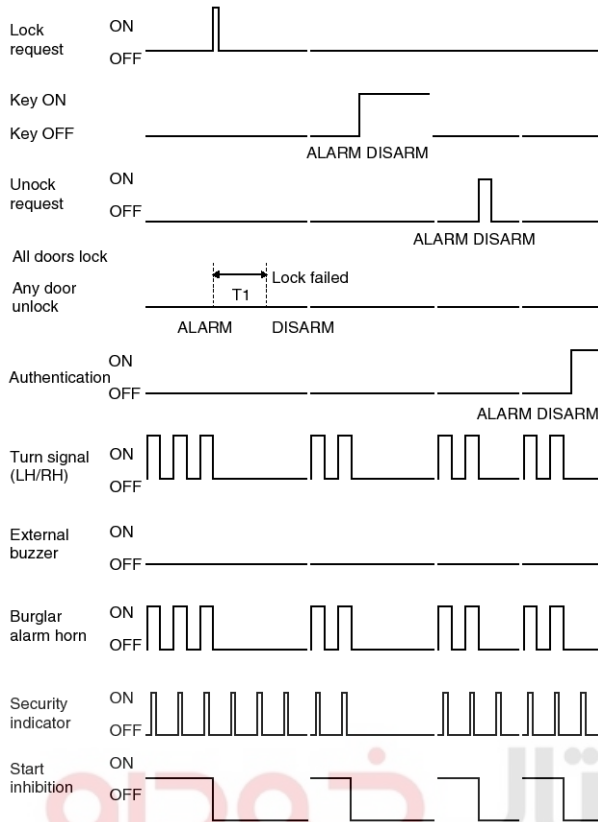
T2 : Arm Disarm buzzer duration ± 10%



T1 : Lock fail confirm time ± 10%

# BE-136

# Body Electrical System



SVGBE0075L

T1 : Lock fail confirm time  $\pm 10\%$



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# Keyless Entry And Burglar Alarm

## BE-137

### ARM WAIT

Security IND is On

On

Security indicator \_\_\_\_\_

Off

SVGBE0076L

#### 1. DISARM to ARMWAIT

##### Condition 1

| State             | Description                                                                                                                                                                                                                                                                                                                                            |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>DISARM STATE</li> <li>Key Out state(Key Off On)</li> <li>All Doors are Close(All Doors Close On)</li> <li>Hood is Close(Hood SW Off)</li> <li>Trunk is Close(Trunk Status Off)</li> </ul>                                                                                                                       |
| Event             | <ol style="list-style-type: none"> <li>Lock by RKE and Locking is not Failed (RKE Lock Confirm Success Off → On) or</li> <li>Lock by SMK and Locking is not Failed (Passive Lock Confirm Success Off → On)</li> </ol>                                                                                                                                  |
| Action            | <ul style="list-style-type: none"> <li>ARM Flashing(Arm Flasher On)</li> <li>ARM Buzzer Activation(Arm Buzzer On)</li> <li>Start ArmWaitTimer</li> <li>State go to ARMWAIT State</li> <li>Burglar alarm State1</li> <li>Along with burglar alarm State 1 send FOB1 and FOB2 signals with values depending on memorized FOB ID Fob1 and Fob2</li> </ul> |

##### Condition 2

| State             | Description                                                                                                                                                                                                                                                                                           |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>DISARM STATE</li> <li>Key Out state(Key Off On)</li> <li>All Doors are Close(All Doors Close On)</li> <li>Hood is Close(Hood switch Off)</li> <li>Trunk is Close(Trunk Status Off)</li> <li>Mechanical key ARM/DISARM Option is enable(MECH Opt On)</li> </ul> |
| Event             | Lock by Mechanical Key and Locking is not Failed (Key Lock Confirm Success Off → On)                                                                                                                                                                                                                  |
| Action            | <ul style="list-style-type: none"> <li>Start ArmWaitTimer</li> <li>State go to ARMWAIT State</li> <li>Burglar alarm State1</li> <li>Along with Burglar alarm State 1 send FOB1 and FOB2 signals with values depending on memorized FOB ID Fob1 and Fob2</li> </ul>                                    |



**BE-138****Body Electrical System****Condition 3**

| State             | Description                                                                                                                                                                                                                                                                                      |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>DISARM STATE</li> <li>Key Out state(Key Off On)</li> <li>All Doors are Lock(All Doors Lock On)</li> <li>Hood is Close(Hood SW Off)</li> <li>Trunk is Close(Trunk Status Off)</li> <li>Mechanical key ARM/DISARM Option is enable (MECH Opt On)</li> </ul> |
| Event             | All Doors are Close (All Doors Close Off → On)                                                                                                                                                                                                                                                   |
| Action            | <ul style="list-style-type: none"> <li>Start ArmWaitTimer</li> <li>State go to ARMWAIT State</li> <li>Burglar alarm State1</li> <li>Along with burglar alarm State 1 send FOB1 aand FOB2 signals with values set to 0</li> </ul>                                                                 |

2. ARMWAIT to ARMWAIT

**Condition 1**

| State             | Description                                                                                                                                                                                                           |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ARMWAIT STATE</li> </ul>                                                                                                                                                       |
| Event             | <ol style="list-style-type: none"> <li>Lock by RKE and Locking is not Failed (RKE Lock Confirm Success Off → On) or</li> <li>Lock by SMK and Locking is not Failed (Passive Lock Confirm Success Off → On)</li> </ol> |
| Action            | <ul style="list-style-type: none"> <li>ARM Flashing (Arm Flasher On)</li> <li>ARM Buzzer Activation (Arm Buzzer On)</li> <li>State does not changed</li> </ul>                                                        |

3. AUTO LOCK TIMER1 to ARMWAIT

**Condition 1**

| State             | Description                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>AUTO LOCK TIMER1 STATE</li> <li>All Doors are Close(All Doors Close On)</li> <li>Hood is Close(Hood switch Off)</li> <li>Trunk is Close(Trunk Status Off)</li> </ul>                                                                                                                                                                           |
| Event             | <ol style="list-style-type: none"> <li>Lock by RKE and Locking is not Failed (RKE Lock Confirm Success Off → On) or</li> <li>Lock by SMK and Locking is not Failed (Passive Lock Confirm Success Off → On)</li> </ol>                                                                                                                                                                 |
| Action            | <ul style="list-style-type: none"> <li>ARM Flashing (Arm Flasher On)</li> <li>ARM Buzzer Activation (Arm Buzzer On)</li> <li>Start ArmWaitTimer</li> <li>Auto Lock Off</li> <li>State go to ARMWAIT State</li> <li>Burglar alarm State1</li> <li>Along with burglar alarm State 1 send FOB1 and FOB2 signals with values dependin-<br/>g on memorized FOB ID Fob1 and Fob2</li> </ul> |

# Keyless Entry And Burglar Alarm

## BE-139

### Condition 2

| State             | Description                                                                                                                                                                                                                                                                                |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>AUTOLOCKTIMER1 STATE</li> <li>All Doors are Close (All Doors Close On)</li> <li>Hood is Close (Hood switch Off)</li> <li>Trunk is Close (Trunk Status Off)</li> <li>Mechanical key ARM/DISARM Option is enable (MECH Opt On)</li> </ul>             |
| Event             | Lock by Mechanical Key and Locking is not Failed (Key Lock Confirm Success Off → On)                                                                                                                                                                                                       |
| Action            | <ul style="list-style-type: none"> <li>Start ArmWait Timer</li> <li>State go to ARMWAIT State</li> <li>Burglar alarm State1</li> <li>Auto Lock Off</li> <li>Along with burglar alarm State 1 send FOB1 and FOB2 signals with values depending on memorized FOB ID Fob1 and Fob2</li> </ul> |

### Condition 3

| State             | Description                                                                                                                                                                                                                                                                                                                      |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>AUTOLOCKTIMER1 STATE</li> <li>All Doors are Close (All Doors Close On)</li> <li>Hood is Close (Hood SW Off)</li> <li>Trunk is Close (Trunk Status Off)</li> </ul>                                                                                                                         |
| Event             | Lock by Auto Lock (AutoLock1Timer ≥ AutoLock1Time) and Locking is not Failed (Auto Lock Confirm Success Off → On)                                                                                                                                                                                                                |
| Action            | <ul style="list-style-type: none"> <li>ARM Flashing (Arm Flasher On)</li> <li>Start ArmWaitTimer</li> <li>State go to ARMWAIT State</li> <li>Burglar alarm State1</li> <li>Auto Lock Off</li> <li>Along with burglar alarm State 1 send FOB1 and FOB2 signals with values depending on memorized FOB ID Fob1 and Fob2</li> </ul> |

#### 4. PREARM to ARMWAIT

### Condition 1

| State             | Description                                                                                                                                                                                                                                                            |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>PREARM STATE</li> </ul>                                                                                                                                                                                                         |
| Event             | Clear TrunkMarker (Trunk Marker Off) and All Doors are Close (All Doors Close On) and Hood is Close (Hood SW Off) and Trunk is Close (Trunk Status Off) and All Doors are Lock (All Doors Lock On)                                                                     |
| Action            | <ul style="list-style-type: none"> <li>ARM Flashing (Arm Flasher On)</li> <li>Start ArmWaitTimer</li> <li>State go to ARMWAIT State</li> <li>Burglar alarm State1</li> <li>Along with burglar alarm State 1 send FOB1 and FOB2 signals with values set to 0</li> </ul> |

**BE-140****Body Electrical System**

## 5. REARM to ARMWAIT

**Condition 1**

| State             | Description                                                                                                                                                                                                                                                                                           |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>REARM STATE</li> <li>Key Out state (Key Off On)</li> <li>All Doors are Close (All Doors Close On)</li> <li>Hood is Close (Hood SW Off)</li> <li>Trunk is Close (Trunk Status Off)</li> </ul>                                                                   |
| Event             | <ol style="list-style-type: none"> <li>Lock by RKE and Locking is not Failed (RKE Lock Confirm Success Off → On) or</li> <li>Lock by SMK and Locking is not Failed (Passive Lock Confirm Success Off → On)</li> </ol>                                                                                 |
| Action            | <ul style="list-style-type: none"> <li>Engine Start Inhibition state is released (Start Inhibition Off)</li> <li>ARM Flashing (Arm Flasher On)</li> <li>ARM Buzzer Activation (Arm Buzzer On)</li> <li>Start ArmWaitTimer</li> <li>State go to ARMWAIT State</li> <li>Burglar alarm State1</li> </ul> |

**Condition 2**

| State             | Description                                                                                                                                                                                                                                                                                           |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>REARM STATE</li> <li>Key Out state (Key Off On)</li> <li>All Doors are Close (All Doors Close On)</li> <li>Hood is Close (Hood SW Off)</li> <li>Trunk is Close (Trunk Status Off)</li> <li>Mechanical key ARM/DISARM Option is enable (MECH Opt On)</li> </ul> |
| Event             | Lock by Mechanical Key and Locking is not Failed (Key Lock Confirm Success Off → On)                                                                                                                                                                                                                  |
| Action            | <ul style="list-style-type: none"> <li>Engine Start Inhibition state is released (Start Inhibition Off)</li> <li>Start ArmWaitTimer</li> <li>State go to ARMWAIT State</li> <li>Burglar alarm State1</li> </ul>                                                                                       |

# Keyless Entry And Burglar Alarm

## BE-141

### 6. ALARM to ARMWAIT

#### Condition 1

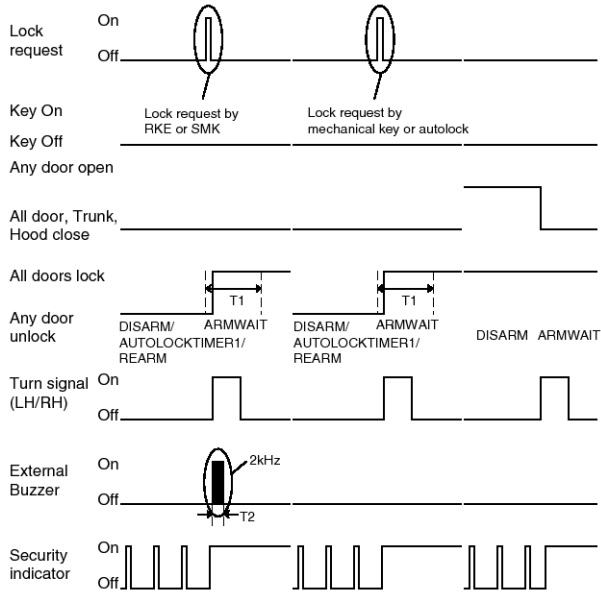
| State             | Description                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ALARM STATE</li> <li>Key Out state(Key Off )</li> <li>All Doors are Close(All Doors Close On)</li> <li>Hood is Close(Hood SW Off)</li> <li>Trunk is Close(Trunk Status Off)</li> </ul>                                                                                                                                                                                                 |
| Event             | <ol style="list-style-type: none"> <li>Lock by RKE and Locking is not Failed (RKE Lock Confirm Success Off → On) or</li> <li>Lock by SMK and Locking is not Failed (Passive Lock Confirm Success Off → On)</li> </ol>                                                                                                                                                                                                         |
| Action            | <ul style="list-style-type: none"> <li>Stop alarm flashing. (Alarm Flasher Off)</li> <li>Stop Burglar Alarm Horn (Burglar Alarm Horn = Off/ Horn Off)</li> <li>Engine Start Inhibition state is released (Start Inhibition Off)</li> <li>ARM Flashing (Arm Flasher On)</li> <li>ARM Buzzer Activation (Arm Buzzer On)</li> <li>Start ArmWaitTimer</li> <li>State go to ARMWAIT State</li> <li>Burglar alarm State1</li> </ul> |

#### Condition 2

| State             | Description                                                                                                                                                                                                                                                                                                                          |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ALARM STATE</li> <li>Key Out state(Key Off )</li> <li>All Doors are Close(All Doors Close On)</li> <li>Hood is Close(Hood SW Off)</li> <li>Trunk is Close(Trunk Status Off)</li> <li>Mechanical key ARM/DISARM Option is enable(MECH Opt On)</li> </ul>                                       |
| Event             | Lock by Mechanical Key and Locking is not Failed (Key Lock Confirm Success Off → On)                                                                                                                                                                                                                                                 |
| Action            | <ul style="list-style-type: none"> <li>Stop alarm flashing. (Alarm Flasher Off)</li> <li>Stop Burglar Alarm Horn(Burglar Alarm Horn Off/ Horn Off)</li> <li>Engine Start Inhibition state is released (Start Inhibition Off)</li> <li>Start ArmWaitTimer</li> <li>State go to ARMWAIT State</li> <li>Burglar alarm State1</li> </ul> |

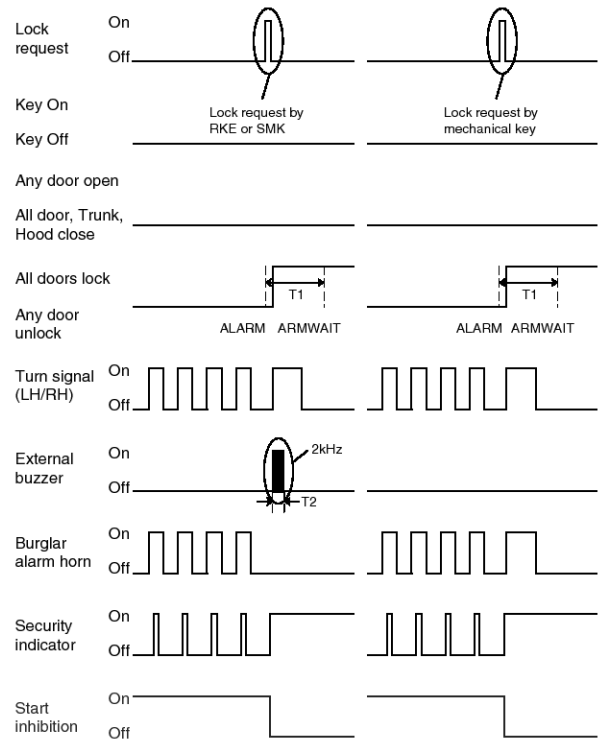
# BE-142

# Body Electrical System



SVGBE0077L

T1 : Lock fail confirm time  $\pm 10\%$ ,  
 T2 : Arm Disarm buzzer duration  $\pm 10\%$



SVGBE0078L

T1 : Lock fail confirm time  $\pm 10\%$ ,  
 T2 : Arm Disarm buzzer duration  $\pm 10\%$

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

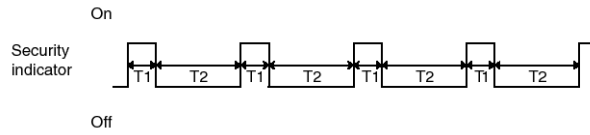
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

# Keyless Entry And Burglar Alarm

## BE-143

### ARM

Security IND is blinking (0.32 sec/On:2 sec/Off)



SVGBE0079L

T1 :  $0.32 \pm 0.032$  sec,

T2 :  $2 \pm 0.2$  sec

1. ARMWAIT to ARM

#### Condition 1

| State             | Description                                                                                              |
|-------------------|----------------------------------------------------------------------------------------------------------|
| Initial Condition | • ARMWAIT STATE                                                                                          |
| Event             | ArmWaitTimer $\geq$ ArmWaitTime                                                                          |
| Action            | <ul style="list-style-type: none"> <li>• Cancel ArmWaitTimer</li> <li>• State go to ARM State</li> </ul> |

2. ARM to ARM

#### Condition 1

| State             | Description                                                                                                                                                                                                                                                               |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• ARM STATE</li> <li>• Key Out state(Key Off)</li> </ul>                                                                                                                                                                           |
| Event             | <ol style="list-style-type: none"> <li>1. Lock by RKE and Locking is not Failed (RKE Lock Confirm Success Off <math>\rightarrow</math> On) or</li> <li>2. Lock by SMK and Locking is not Failed (Passive Lock Confirm Success Off <math>\rightarrow</math> On)</li> </ol> |
| Action            | <ul style="list-style-type: none"> <li>• ARM Flashing(Arm Flasher On)</li> <li>• ARM Buzzer Activation(Arm Buzzer On)</li> <li>• State does not change</li> </ul>                                                                                                         |

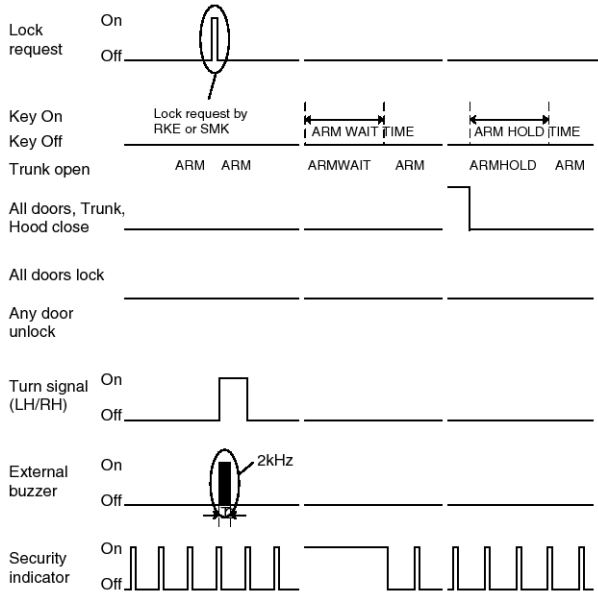
3. ARMHOLD to ARM

#### Condition 1

| State             | Description                                                                                                  |
|-------------------|--------------------------------------------------------------------------------------------------------------|
| Initial Condition | • ARMHOLD STATE                                                                                              |
| Event             | Trunk is Close(Trunk Status Off) and Trunk Timer is expired.<br>(Trunk Timer $\geq$ Trunk Release Time Out), |
| Action            | <ul style="list-style-type: none"> <li>• Cancel Trunk Timer</li> <li>• State go to ARM State</li> </ul>      |

# BE-144

# Body Electrical System



SVGBE0080L

T1 :  $0.32 \pm 0.032$  sec,

T2 :  $2 \pm 0.2$  sec

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



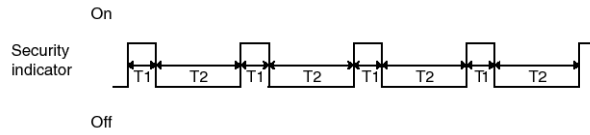


# Keyless Entry And Burglar Alarm

## BE-145

### ARMHOLD

Security IND is blinking (0.32 sec/On:2 sec/Off)



SVGBE0079L

T1 : 0.32 ± 0.032 sec,

T2 : 2 ± 0.2 sec

1. ARM to ARMHOLD

#### Condition 1

| State             | Description                                                                                  |
|-------------------|----------------------------------------------------------------------------------------------|
| Initial Condition | • ARM STATE                                                                                  |
| Event             | 1. Trunk release by RKE(RKE Trunk Off → On) or<br>2. Trunk release by SMK (P TRUNK Off → On) |
| Action            | • State go to ARMHOLD State<br>• Start Trunk Timer                                           |

#### Condition 2

| State             | Description                                                               |
|-------------------|---------------------------------------------------------------------------|
| Initial Condition | • ARM STATE<br>• Mechanical key ARM/DISARM Option is enable (MECH Opt On) |
| Event             | Trunk release by Mechanical Key (Trunk Key Unlock SW Off → On)            |
| Action            | • State go to ARMHOLD State<br>• Start Trunk Timer                        |

2. ARMHOLD to ARMHOLD

#### Condition 1

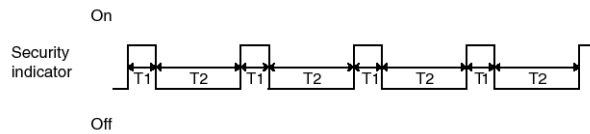
| State             | Description                                             |
|-------------------|---------------------------------------------------------|
| Initial Condition | • ARMHOLD STATE                                         |
| Event             | Trunk closed(Trunk Status On → Off)                     |
| Action            | • State remains in ARMHOLD State<br>• Start Trunk Timer |

#### Condition 2

| State             | Description                                              |
|-------------------|----------------------------------------------------------|
| Initial Condition | • ARMHOLD STATE                                          |
| Event             | Trunk is open (Trunk Status On)                          |
| Action            | • State remains in ARMHOLD State<br>• Cancel Trunk Timer |

**BE-146****Body Electrical System****AUTOLOCKTIMER1**

Security IND is blinking (0.32 sec/On:2 sec/Off)



SVGBE0079L

T1 : 0.32 ± 0.032 sec,

T2 : 2 ± 0.2 sec

1. DISARM to AUTOLOCKTIMER1

**Condition 1**

| State             | Description                                                                                                                                                                                                                      |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>DISARM STATE</li> <li>Key Out state(Key Off On)</li> <li>All Doors are Close(All Doors Close On)</li> <li>Hood is Close(Hood SW Off)</li> <li>Trunk is Close(Trunk Status Off)</li> </ul> |
| Event             | <ol style="list-style-type: none"> <li>Unlock by SMK(Passive Access Unlock Off → On) or</li> <li>Unlock by RKE(RKE Unlock Off → On)</li> </ol>                                                                                   |
| Action            | <ul style="list-style-type: none"> <li>DISARM Flashing(Disarm Flasher On)</li> <li>DISARM Buzzer Activation(Disarm Buzzer On)</li> <li>Start Auto Lock1Timer</li> <li>State go to AUTO LOCK TIMER1 State</li> </ul>              |

2. ARMWAIT to AUTOLOCKTIMER1

**Condition 1**

| State             | Description                                                                                                                                                                                                      |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ARMAWAIT STATE</li> <li>All Doors are Close (All Doors Close On)</li> <li>Hood is Close(Hood SW Off)</li> <li>Trunk is Close(Trunk Status Off)</li> </ul>                 |
| Event             | <ol style="list-style-type: none"> <li>Unlock by SMK(Passive Access Unlock Off → On) or</li> <li>Unlock by RKE(RKE Unlock Off → On)</li> </ol>                                                                   |
| Action            | <ul style="list-style-type: none"> <li>DISARM Flashing(Disarm Flasher On)</li> <li>DISARM Buzzer Activation(Disarm Buzzer On)</li> <li>Start AutoLock1Timer</li> <li>State go to AUTOLOCKTIMER1 State</li> </ul> |

# Keyless Entry And Burglar Alarm

## BE-147

### 3. ARM to AUTOLOCKTIMER1

#### Condition 1

| State             | Description                                                                                                                                                                                                      |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ARM STATE</li> <li>All Doors are Close(All Doors Close On)</li> <li>Hood is Close(Hood switch Off)</li> <li>Trunk is Close(Trunk Status Off)</li> </ul>                   |
| Event             | <ol style="list-style-type: none"> <li>Unlock by SMK(Passive Access Unlock Off → On) or</li> <li>Unlock by RKE(RKE Unlock Off → On)</li> </ol>                                                                   |
| Action            | <ul style="list-style-type: none"> <li>DISARM Flashing(Disarm Flasher On)</li> <li>DISARM Buzzer Activation(Disarm Buzzer On)</li> <li>Start AutoLock1Timer</li> <li>State go to AUTOLOCKTIMER1 State</li> </ul> |

### 4. AUTOLOCKTIMER1 to AUTOLOCKTIMER1

#### Condition 1

| State             | Description                                                                                                                                                                                              |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>AUTOLOCKTIMER1 STATE</li> <li>All Doors are Close(All Doors Close On)</li> <li>Hood is Close(Hood SW Off)</li> <li>Trunk is Close(Trunk Status Off)</li> </ul>    |
| Event             | <ol style="list-style-type: none"> <li>Unlock by SMK(Passive Access Unlock Off → On) or</li> <li>Unlock by RKE(RKE Unlock Off → On)</li> </ol>                                                           |
| Action            | <ul style="list-style-type: none"> <li>DISARM Flashing(Disarm Flasher On)</li> <li>DISARM Buzzer Activation(Disarm Buzzer On)</li> <li>Restart AutoLock1Timer</li> <li>State does not changed</li> </ul> |

#### Condition 2

| State             | Description                                                                                                                                                 |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>AUTOLOCKTIMER1 STATE</li> </ul>                                                                                      |
| Event             | <ol style="list-style-type: none"> <li>AutoLock1Timer timer is elapsed (<math>\text{AutoLock1Timer} \geq \text{AutoLock1Time}</math>)</li> </ol>            |
| Action            | <ul style="list-style-type: none"> <li>Cancel AutoLock1Timer</li> <li>Lock by Autolock (Auto Lock On; Relock On)</li> <li>State does not changed</li> </ul> |

**BE-148****Body Electrical System**

## 5. REARM to AUTOLOCKTIMER1

**Condition 1**

| State             | Description                                                                                                                                                                                                                                                                                |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>REARM STATE</li> <li>All Doors are Close(All Doors Close On)</li> <li>Hood is Close(Hood SW Off)</li> <li>Trunk is Close(Trunk Status Off)</li> </ul>                                                                                               |
| Event             | <ol style="list-style-type: none"> <li>Unlock by SMK(Passive Access Unlock Off → On) or</li> <li>Unlock by RKE(RKE Unlock Off → On)</li> </ol>                                                                                                                                             |
| Action            | <ul style="list-style-type: none"> <li>Engine Start Inhibition state is released (Start Inhibition Off)</li> <li>DISARM Flashing(Disarm Flasher On)</li> <li>DISARM Buzzer Activation(Disarm Buzzer On)</li> <li>Start AutoLock1Timer</li> <li>State go to AUTOLOCKTIMER1 State</li> </ul> |

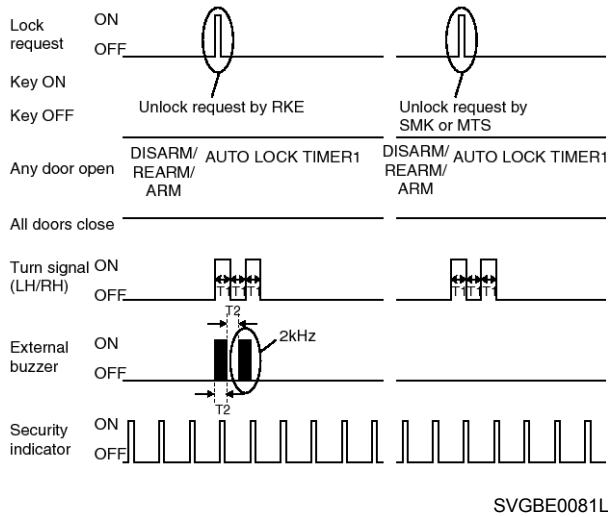
## 6. ALARM to AUTOLOCKTIMER1

**Condition 1**

| State             | Description                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ALARM STATE</li> <li>All Doors are Close(All Doors Close On)</li> <li>Hood is Close(Hood SW Off)</li> <li>Trunk is Close(Trunk Status Off)</li> </ul>                                                                                                                                                                                                                    |
| Event             | <ol style="list-style-type: none"> <li>Unlock by SMK(Passive Access Unlock Off → On) or</li> <li>Unlock by RKE(RKE Unlock Off → On)</li> </ol>                                                                                                                                                                                                                                                                  |
| Action            | <ul style="list-style-type: none"> <li>Stop alarm flashing. (Alarm Flasher Off)</li> <li>Stop Burglar Alarm Horn(Burglar Alarm Horn Off/ Horn Off)</li> <li>Engine Start Inhibition state is released (Start Inhibition Off)</li> <li>DISARM Flashing(Disarm Flasher On)</li> <li>DISARM Buzzer Activation(Disarm Buzzer On)</li> <li>Start AutoLock1Timer</li> <li>State go to AUTOLOCKTIMER1 State</li> </ul> |

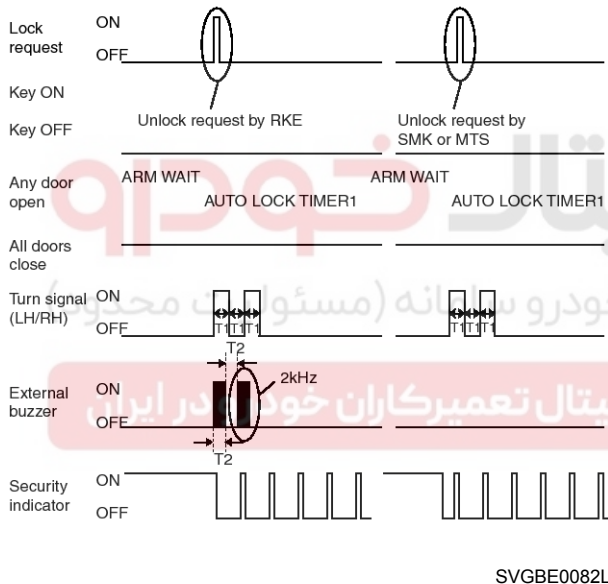
# Keyless Entry And Burglar Alarm

## BE-149



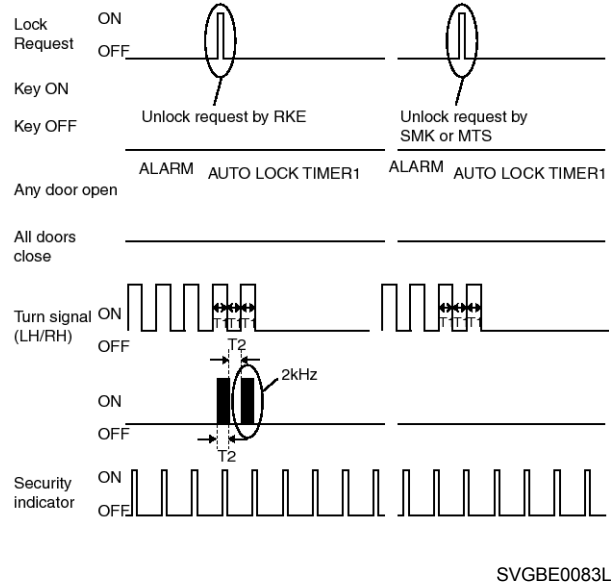
T1 : 0.5 ± 0.05 Sec,

T2 : Arm Disarm buzzer duration ± 10%



T1 : 0.5 ± 0.05 Sec,

T2 : Arm Disarm buzzer duration ± 10%

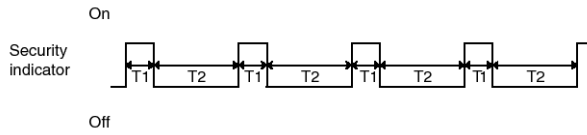


T1 : 0.5 ± 0.05 Sec,

T2 : Arm Disarm buzzer duration ± 10%

**BE-150****Body Electrical System****AUTOLOCKTIMER2**

Security IND is blinking (0.32 sec/On:2 sec/Off)



SVGBE0079L

T1 : 0.32 ± 0.032 sec,

T2 : 2 ± 0.2 sec

1. DISARM to AUTOLOCKTIMER2

**Condition 1**

| State             | Description                                                                                                                                                                                                                                                             |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>DISARM STATE</li> <li>Key Out state (Key Off)</li> <li>All Doors are Close (All Doors Close On)</li> <li>Hood is Open (Hood SW On)</li> <li>Trunk is Close (Trunk Status Off)</li> </ul>                                         |
| Event             | <ol style="list-style-type: none"> <li>Unlock by SMK (Passive Access Unlock Off → On) or</li> <li>Unlock by RKE (RKE Unlock Off → On)</li> </ol>                                                                                                                        |
| Action            | <ul style="list-style-type: none"> <li>DISARM Flashing (Disarm Flasher On)</li> <li>DISARM Buzzer Activation (Disarm Buzzer On)</li> <li>Memorize Hood Open State (Hood Open On)</li> <li>Start Auto Lock2 Timer</li> <li>State go to AUTO LOCK TIMER2 State</li> </ul> |

**Condition 2**

| State             | Description                                                                                                                                                                                                                                                        |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>DISARM STATE</li> <li>Key Out state(Key Off On)</li> <li>All Doors are Close(All Doors Close On)</li> <li>Hood is Close(Hood SW Off)</li> <li>Trunk is Open(Trunk Status On)</li> </ul>                                     |
| Event             | <ol style="list-style-type: none"> <li>Unlock by SMK(Passive Access Unlock Off → On) or</li> <li>Unlock by RKE(RKE Unlock Off → On)</li> </ol>                                                                                                                     |
| Action            | <ul style="list-style-type: none"> <li>DISARM Flashing(Disarm Flasher On)</li> <li>DISARM Buzzer Activation(Disarm Buzzer On)</li> <li>Memorize Trunk Open State(Trunk Open On)</li> <li>Start AutoLock2Timer</li> <li>State go to AUTOLOCKTIMER2 State</li> </ul> |

# Keyless Entry And Burglar Alarm

## BE-151

### Condition 3

| State             | Description                                                                                                                                                                                                                                                                                                        |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>DISARM STATE</li> <li>Key Out state(Key Off On)</li> <li>All Doors are Close(All Doors Close On)</li> <li>Hood is Open(Hood SW On)</li> <li>Trunk is Open(Trunk Status On)</li> </ul>                                                                                       |
| Event             | <ol style="list-style-type: none"> <li>Unlock by SMK(Passive Access Unlock Off → On) or</li> <li>Unlock by RKE(RKE Unlock Off → On)</li> </ol>                                                                                                                                                                     |
| Action            | <ul style="list-style-type: none"> <li>DISARM Flashing(Disarm Flasher On)</li> <li>DISARM Buzzer Activation(Disarm Buzzer On)</li> <li>Memorize Hood Open State(Hood Open On)</li> <li>Memorize Trunk Open State(Trunk Open On)</li> <li>Start AutoLock2Timer</li> <li>State go to AUTOLOCKTIMER2 State</li> </ul> |

2. ARMHOLD to AUTOLOCKTIMER2

### Condition 1

| State             | Description                                                                                                                                                                                                                                                        |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ARMHOLD STATE</li> <li>All Doors are Close(All Doors Close On)</li> </ul>                                                                                                                                                   |
| Event             | <ol style="list-style-type: none"> <li>Unlock by SMK(Passive Access Unlock Off → On) or</li> <li>Unlock by RKE(RKE Unlock Off → On)</li> </ol>                                                                                                                     |
| Action            | <ul style="list-style-type: none"> <li>DISARM Flashing(Disarm Flasher On)</li> <li>DISARM Buzzer Activation(Disarm Buzzer On)</li> <li>Memorize Trunk Open State(Trunk Open On)</li> <li>Start AutoLock2Timer</li> <li>State go to AUTOLOCKTIMER2 State</li> </ul> |

3. AUTOLOCKTIMER2 to AUTOLOCKTIMER2

### Condition 1

| State             | Description                                                                                                                                                                                              |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>AUTOLOCKTIMER2 STATE</li> </ul>                                                                                                                                   |
| Event             | <ol style="list-style-type: none"> <li>Unlock by SMK(Passive Access Unlock Off → On) or</li> <li>Unlock by RKE(RKE Unlock Off → On)</li> </ol>                                                           |
| Action            | <ul style="list-style-type: none"> <li>DISARM Flashing(Disarm Flasher On)</li> <li>DISARM Buzzer Activation(Disarm Buzzer On)</li> <li>Restart AutoLock2Timer</li> <li>State does not changed</li> </ul> |



**BE-152****Body Electrical System****Condition 2**

| State             | Description                                                                                                                                                 |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>AUTOLOCKTIMER2 STATE</li> </ul>                                                                                      |
| Event             | AutoLock2Timer timer is elapsed (Auto Lock2 Timer $\geq$ AutoLock2Time)                                                                                     |
| Action            | <ul style="list-style-type: none"> <li>Cancel AutoLock2Timer</li> <li>Lock by Autolock (Auto Lock On; Relock On)</li> <li>State does not changed</li> </ul> |

4. PREARM to AUTOLOCKTIMER2

**Condition 1**

| State             | Description                                                                                                                                                                                                                                                         |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>PREARM STATE</li> <li>All Doors are Close (All Doors Close On)</li> <li>Hood is Open (Hood switch On)</li> <li>Trunk is Close(Trunk Status Off)</li> </ul>                                                                   |
| Event             | <ol style="list-style-type: none"> <li>Unlock by SMK (Passive Access Unlock Off <math>\rightarrow</math> On) or</li> <li>Unlock by RKE (RKE Unlock Off <math>\rightarrow</math> On)</li> </ol>                                                                      |
| Action            | <ul style="list-style-type: none"> <li>DISARM Flashing (Disarm Flasher On)</li> <li>DISARM Buzzer Activation (Disarm Buzzer On)</li> <li>Memorize Hood Open State (Hood Open On)</li> <li>Start AutoLock2Timer</li> <li>State go to AUTOLOCKTIMER2 State</li> </ul> |

**Condition 2**

| State             | Description                                                                                                                                                                                                                                                              |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>PREARM STATE</li> <li>All Doors are Close (All Doors Close On)</li> <li>Hood is Close (Hood switch Off)</li> <li>Trunk is Open (Trunk Status On)</li> </ul>                                                                       |
| Event             | <ol style="list-style-type: none"> <li>Unlock by SMK (Passive Access Unlock Off <math>\rightarrow</math> On) or</li> <li>Unlock by RKE (RKE Unlock Off <math>\rightarrow</math> On)</li> </ol>                                                                           |
| Action            | <ul style="list-style-type: none"> <li>DISARM Flashing (Disarm Flasher On)</li> <li>DISARM Buzzer Activation (Disarm Buzzer On)</li> <li>Memorize Trunk Open State (Trunk Open On)</li> <li>Start AutoLock2 Timer</li> <li>State go to AUTO LOCK TIMER2 State</li> </ul> |

# Keyless Entry And Burglar Alarm

## BE-153

### Condition 3

| State             | Description                                                                                                                                                                                                                                                                                                                        |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• PREARM STATE</li> <li>• All Doors are Close(All Doors Close On)</li> <li>• Hood is Open (Hood switch On)</li> <li>• Trunk is Open (Trunk Status On)</li> </ul>                                                                                                                            |
| Event             | <ol style="list-style-type: none"> <li>1. Unlock by SMK(Passive Access Unlock Off → On) or</li> <li>2. Unlock by RKE(RKE Unlock Off → On)</li> </ol>                                                                                                                                                                               |
| Action            | <ul style="list-style-type: none"> <li>• DISARM Flashing(Disarm Flasher On)</li> <li>• DISARM Buzzer Activation (Disarm Buzzer On)</li> <li>• Memorize Hood Open State (Hood Open On)</li> <li>• Memorize Trunk Open State (Trunk Open On)</li> <li>• Start Auto Lock2Timer</li> <li>• State go to AUTOLOCKTIMER2 State</li> </ul> |

### 5. ALARM to AUTOLOCKTIMER2

### Condition 1

| State             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• ALARM STATE</li> <li>• All Doors are Close(All Doors Close On)</li> <li>• Hood is Open(Hood switch On)</li> <li>• Trunk is Close(Trunk Status Off)</li> </ul>                                                                                                                                                                                                                                                                                |
| Event             | <ol style="list-style-type: none"> <li>1. Unlock by SMK (Passive Access Unlock Off → On) or</li> <li>2. Unlock by RKE (RKE Unlock Off → On)</li> </ol>                                                                                                                                                                                                                                                                                                                                |
| Action            | <ul style="list-style-type: none"> <li>• Stop alarm flashing. (Alarm Flasher Off)</li> <li>• Stop Burglar Alarm Horn (Burglar alarm Horn Off/ Horn Off)</li> <li>• Engine Start Inhibition state is released (Start Inhibition Off)</li> <li>• DISARM Flashing(Disarm Flasher On)</li> <li>• DISARM Buzzer Activation (Disarm Buzzer On)</li> <li>• Memorize Hood Open State (Hood Open On)</li> <li>• Start AutoLock2 Timer</li> <li>• State go to AUTO LOCK TIMER2 State</li> </ul> |

**BE-154****Body Electrical System****Condition 2**

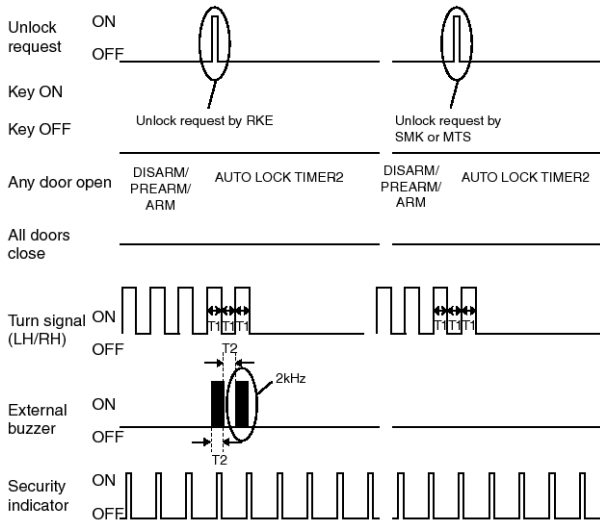
| State             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• ALARM STATE</li> <li>• All Doors are Close (All Doors Close On)</li> <li>• Hood is Close (Hood switch Off)</li> <li>• Trunk is Open (Trunk Status On)</li> </ul>                                                                                                                                                                                                                                                                                  |
| Event             | <ol style="list-style-type: none"> <li>1. Unlock by SMK (Passive Access Unlock Off → On) or</li> <li>2. Unlock by RKE (RKE Unlock Off → On)</li> </ol>                                                                                                                                                                                                                                                                                                                                     |
| Action            | <ul style="list-style-type: none"> <li>• Stop alarm flashing. (Alarm Flasher Off)</li> <li>• Stop Burglar Alarm Horn (Burglar Alarm Horn Off/ Horn Off)</li> <li>• Engine Start Inhibition state is released (Start Inhibition Off)</li> <li>• DISARM Flashing (Disarm Flasher On)</li> <li>• DISARM Buzzer Activation (Disarm Buzzer On)</li> <li>• Memorize Trunk Open State ( Trunk Open On)</li> <li>• Start Auto Lock2 Timer</li> <li>• State go to AUTO LOCK TIMER2 State</li> </ul> |

**Condition 3**

| State             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• ALARM STATE</li> <li>• All Doors are Close (All Doors Close On)</li> <li>• Hood is Close (Hood switch On)</li> <li>• Trunk is Open (Trunk Status On)</li> </ul>                                                                                                                                                                                                                                                                                                                                    |
| Event             | <ol style="list-style-type: none"> <li>1. Unlock by SMK (Passive Access Unlock Off → On) or</li> <li>2. Unlock by RKE (RKE Unlock Off → On)</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                      |
| Action            | <ul style="list-style-type: none"> <li>• Stop alarm flashing. (Alarm Flasher Off)</li> <li>• Stop Burglar Alarm Horn (Burglar Alarm Horn Off/ Horn Off)</li> <li>• Engine Start Inhibition state is released (Start Inhibition Off)</li> <li>• DISARM Flashing (Disarm Flasher On)</li> <li>• DISARM Buzzer Activation (Disarm Buzzer On)</li> <li>• Memorize Hood Open State (Hood Open On)</li> <li>• Memorize Trunk Open State (Trunk Open On)</li> <li>• Start AutoLock2 Timer</li> <li>• State go to AUTO LOCK TIMER2 State</li> </ul> |

# Keyless Entry And Burglar Alarm

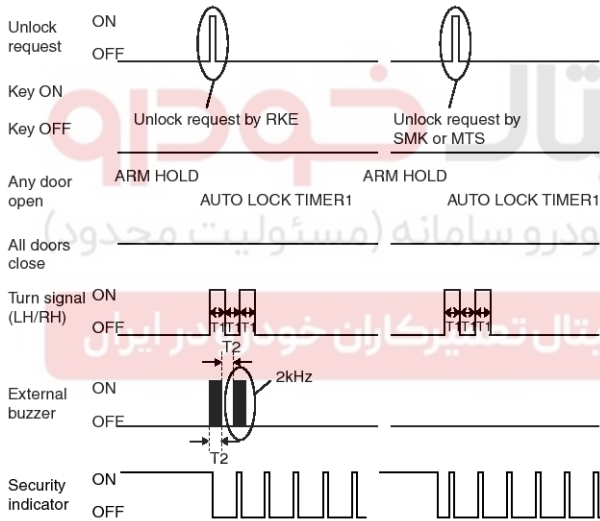
## BE-155



SVGBE0084L

T1 : 0.5 ± 0.05 Sec,

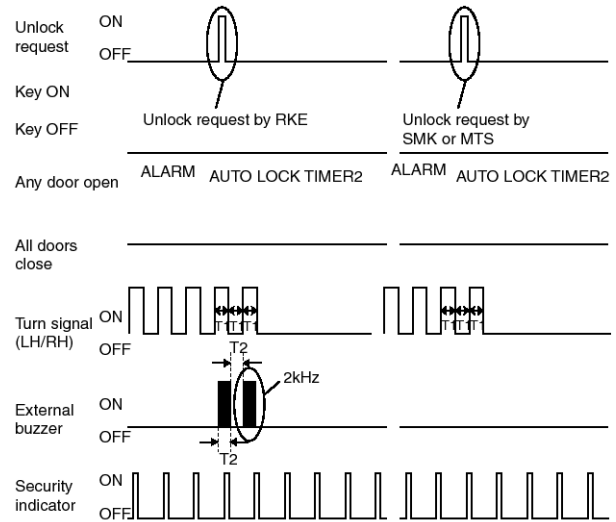
T2 : Arm Disarm buzzer duration ± 10%



SVGBE0085L

T1 : 0.5 ± 0.05 Sec,

T2 : Arm Disarm buzzer duration ± 10%



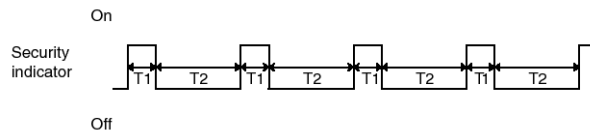
SVGBE0086L

T1 : 0.5 ± 0.05 Sec,

T2 : Arm Disarm buzzer duration ± 10%

**BE-156****Body Electrical System****PREARM**

Security IND is blinking (0.32 sec/On:2 sec/Off)



SVGBE0079L

T1 :  $0.32 \pm 0.032$  sec,

T2 :  $2 \pm 0.2$  sec

1. DISARM to PREARM

**Condition 1**

| State             | Description                                                                                                                                                                                                           |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>DISARM STATE</li> <li>Key Out state(Key Off On)</li> <li>Any Door is Open (Any Door Open On) or Hood is Open (Hood switch On) or Trunk is Open(Trunk Status On)</li> </ul>     |
| Event             | <ol style="list-style-type: none"> <li>Lock by RKE and Locking is not Failed (RKE Lock Confirm Success Off → On) or</li> <li>Lock by SMK and Locking is not Failed (Passive Lock Confirm Success Off → On)</li> </ol> |
| Action            | <ul style="list-style-type: none"> <li>State go to PREARM State</li> <li>Reset Trunk Marker(Trunk Marker Off)</li> </ul>                                                                                              |

**Condition 2**

| State             | Description                                                                                                                                                                                                                                                                       |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>DISARM STATE</li> <li>Key Out state(Key Off On)</li> <li>Any Door is Open (Any Door Open On) or (Hood is Open (Hood SW On) or Trunk is Open (Trunk Status On)</li> <li>Mechanical key ARM/DISARM Option is enable (MECH Opt On)</li> </ul> |
| Event             | Lock by Mechanical Key and Locking is not Failed (Key Lock Confirm Success Off → On)                                                                                                                                                                                              |
| Action            | <ul style="list-style-type: none"> <li>State go to PREARM State</li> <li>Reset Trunk Marker (Trunk Marker Off)</li> </ul>                                                                                                                                                         |

**Condition 3**

| State             | Description                                                                                                                                                                                                                                                                                                                             |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>DISARM STATE</li> <li>Key Out state (Key Off On)</li> <li>Any Door is Open (Any Door Open On)</li> <li>Hood is Open (Hood SW On) or Trunk is Open (Trunk Status On)</li> <li>All Doors are Lock (All Doors Lock On)</li> <li>Mechanical key ARM/DISARM Option is enable (MECH Opt On)</li> </ul> |
| Event             | All Doors are Close (All Doors Close On)                                                                                                                                                                                                                                                                                                |
| Action            | <ul style="list-style-type: none"> <li>State go to PREARM State</li> <li>Reset Trunk Marker (Trunk Marker Off)</li> </ul>                                                                                                                                                                                                               |

# Keyless Entry And Burglar Alarm

## BE-157

### 2. ARMWAIT to PREARM

#### Condition 1

| State             | Description                                                                                                                                             |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• ARMWAIT STATE</li> </ul>                                                                                       |
| Event             | <ol style="list-style-type: none"> <li>1. Trunk release by RKE (RKE Trunk Off → On) or</li> <li>2. Trunk release by SMK (TRUNK Off → On)</li> </ol>     |
| Action            | <ul style="list-style-type: none"> <li>• Start Trunk Timer</li> <li>• Set Trunk Marker (Trunk Marker On)</li> <li>• State go to PREARM State</li> </ul> |

#### Condition 2

| State             | Description                                                                                                                                            |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• ARMWAIT STATE</li> <li>• Mechanical key ARM/DISARM Option is enable (MECH Opt On)</li> </ul>                  |
| Event             | Trunk release by Mechanical Key (Trunk Key Unlock switch Off → On)                                                                                     |
| Action            | <ul style="list-style-type: none"> <li>• Start Trunk Timer</li> <li>• Set Trunk Marker(Trunk Marker On)</li> <li>• State go to PREARM State</li> </ul> |

### 3. ARMHOLD to PREARM

#### Condition 1

| State             | Description                                                                                                                                  |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• ARMHOLD STATE</li> </ul>                                                                            |
| Event             | <ol style="list-style-type: none"> <li>1. Lock by RKE(RKE Lock Off → On) or</li> <li>2. Lock by SMK(Passive Access Lock Off → On)</li> </ol> |
| Action            | <ul style="list-style-type: none"> <li>• State go to PREARM State</li> <li>• Reset Trunk Marker(Trunk Marker Off)</li> </ul>                 |

#### Condition 2

| State             | Description                                                                                                                          |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• ARMHOLD STATE</li> <li>• Mechanical key ARM/DISARM Option is enable(MECH Opt On)</li> </ul> |
| Event             | Lock by Mechanical Key(DRV Key Lock Off → On)                                                                                        |
| Action            | <ul style="list-style-type: none"> <li>• State go to PREARM State</li> <li>• Reset Trunk Marker(Trunk Marker Off)</li> </ul>         |

**BE-158****Body Electrical System**

## 4. AUTOLOCKTIMER2 to PREARM

**Condition 1**

| State             | Description                                                                                                                                                                                                                                                                                                                                                             |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>AUTOLOCKTIMER2 STATE</li> </ul>                                                                                                                                                                                                                                                                                                  |
| Event             | <ol style="list-style-type: none"> <li>Lock by RKE(RKE Lock Off → On) and Locking is not Failed (Lock Confirm Fail Off) or</li> <li>Lock by SMK(Passive Access Lock Off → On) and Locking is not Failed (Lock Confirm Fail Off) or</li> <li>Lock by AutoLock Auto Lock On (AutoLock2Timer ≥ AutoLock2Time) and Locking is not Failed (Lock Confirm Fail Off)</li> </ol> |
| Action            | <ul style="list-style-type: none"> <li>State go to PREARM State</li> <li>Hood Open Off</li> <li>Trunk Open Off</li> <li>Auto Lock Off</li> <li>Reset Trunk Marker(Trunk Marker Off)</li> </ul>                                                                                                                                                                          |

**Condition 2**

| State             | Description                                                                                                                                                                                   |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>AUTOLOCKTIMER2 STATE</li> <li>Mechanical key ARM/DISARM Option is enable(MECH Opt On)</li> </ul>                                                       |
| Event             | Lock by Mechanical Key and Locking is not Failed (Key Lock Confirm Success Off → On)                                                                                                          |
| Action            | <ul style="list-style-type: none"> <li>State go to PREARM State</li> <li>Hood Open Off</li> <li>Trunk Open Off</li> <li>Auto Lock Off</li> <li>Reset TrunkMarker(Trunk Marker Off)</li> </ul> |

## 5. PREARM to PREARM

**Condition 1**

| State             | Description                                                                                                                                       |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>PREARM STATE</li> <li>Trunk is Close(Trunk Status Off)</li> </ul>                                          |
| Event             | <ol style="list-style-type: none"> <li>Trunk is open(Trunk Status On)</li> <li>Trunk Timer ≥ Trunk Release Time Out</li> </ol>                    |
| Action            | <ul style="list-style-type: none"> <li>Cancel Trunk Timer</li> <li>Reset Trunk Marker(Trunk Marker Off)</li> <li>State does not change</li> </ul> |



# Keyless Entry And Burglar Alarm

## BE-159

### 6. ALARM to PREARM

#### Condition 1

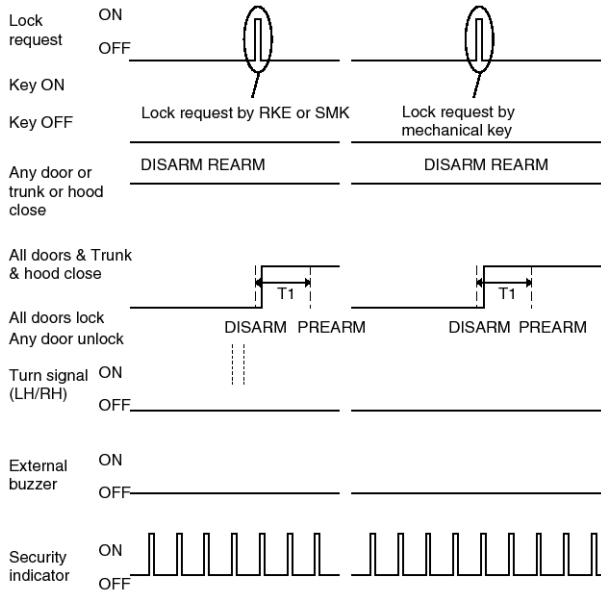
| State             | Description                                                                                                                                                                                                                                          |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ALARM STATE</li> <li>Key Out state(Key Off)</li> <li>Any Door is Open(Any Door Open On) or Hood is Open(Hood SW On) or Trunk is Open(Trunk Status On)</li> </ul>                                              |
| Event             | <ol style="list-style-type: none"> <li>Lock by RKE(RKE Lock Off → On) and Locking is not Failed (Lock Confirm Fail Off) or</li> <li>Lock by SMK(Passive Access Lock Off → On) and Locking is not Failed (Lock Confirm Fail Off)</li> </ol>           |
| Action            | <ul style="list-style-type: none"> <li>Stop alarm flashing. (Alarm Flasher Off)</li> <li>Engine Start Inhibition state is released (Start Inhibition Off)</li> <li>Reset Trunk Marker(Trunk Marker Off)</li> <li>State go to PREARM State</li> </ul> |

#### Condition 2

| State             | Description                                                                                                                                                                                                                                                                          |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>AUTOLOCKTIMER2 STATE</li> <li>Key Out state(Key Off On)</li> <li>Any Door is Open(Any Door Open On) or Hood is Open(Hood SW On) or Trunk is Open(Trunk Status On)</li> <li>Mechanical key ARM/DISARM Option is enable(MECH Opt On)</li> </ul> |
| Event             | Lock by Mechanical Key(DRV Key Lock Off → On) and Locking is not Failed (Lock Confirm Fail Off)                                                                                                                                                                                      |
| Action            | <ul style="list-style-type: none"> <li>Stop alarm flashing. (Alarm Flasher Off)</li> <li>Engine Start Inhibition state is released (Start Inhibition Off)</li> <li>Reset Trunk Marker(Trunk Marker Off)</li> <li>State go to PREARM State</li> </ul>                                 |

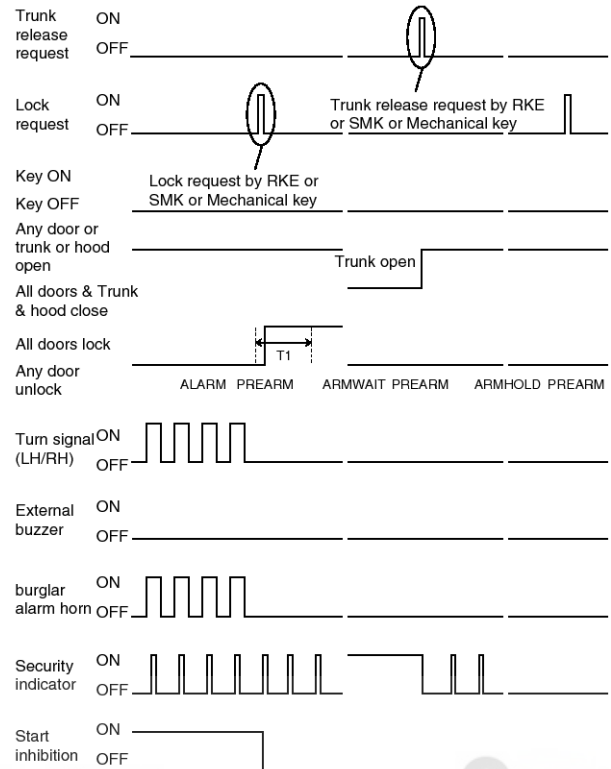
# BE-160

# Body Electrical System



SVGBE0087L

T1 : Lock fail conform time  $\pm 10\%$ ,  
 T2 : Arm Disarm buzzer duration  $\pm 10\%$



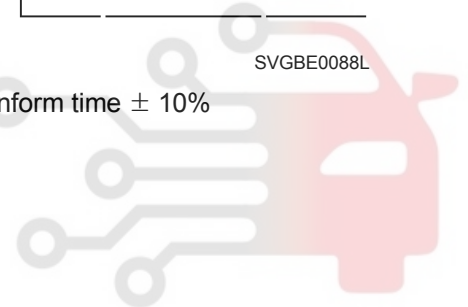
SVGBE0088L

T1 : Lock fail conform time  $\pm 10\%$

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

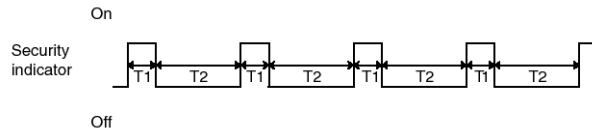


# Keyless Entry And Burglar Alarm

## BE-161

### REARM

Security IND is blinking (0.32 sec/On:2 sec/Off)



SVGBE0079L

T1 : 0.32 ± 0.032 sec,

T2 : 2 ± 0.2 sec

1. ALARM to REARM

### Condition 1

| State             | Description                                                                                                                                           |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ALARM STATE</li> <li>Non China Option (China Option Off)</li> </ul>                                            |
| Event             | All Doors are Close(All Doors Close On) and Hood is Close(Hood SW Off) Trunk is Close(Trunk Status Off) and Finish ALARM Flashing (Alarm Flasher Off) |
| Action            | <ul style="list-style-type: none"> <li>State go to REARM State</li> </ul>                                                                             |

### Condition 2

| State             | Description                                                                                                                                                       |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ALARM STATE</li> <li>China Option (China Option On)</li> </ul>                                                             |
| Event             | Key Off and All Doors are Close(All Doors Close On) and Hood is Close(Hood SW Off) Trunk is Close(Trunk Status Off) and Finish ALARM Flashing (Alarm Flasher Off) |
| Action            | <ul style="list-style-type: none"> <li>State go to REARM State</li> </ul>                                                                                         |

2. REARM to REARM

### Condition 1

| State             | Description                                                                                               |
|-------------------|-----------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>REARM STATE</li> <li>Key In Off or IGN1 Off or IGN2 Off</li> </ul> |
| Event             | Key In On && IGN1 On && IGN2 On                                                                           |
| Action            | <ul style="list-style-type: none"> <li>Start KeyIGNTimer</li> <li>State does not change</li> </ul>        |

### Condition 2

| State             | Description                                                                                           |
|-------------------|-------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>REARM STATE</li> <li>KeyIGNTimer &lt; KeyIGNTime</li> </ul>    |
| Event             | Key In Off or IGN1 Off or IGN2 Off                                                                    |
| Action            | <ul style="list-style-type: none"> <li>Cancel Key IGN Timer</li> <li>State does not change</li> </ul> |

# BE-162

# Body Electrical System

### Condition 3

| State             | Description                                                                                                                             |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>REARM STATE</li> </ul>                                                                           |
| Event             | Key IGN Timer $\geq$ Key IGN Time                                                                                                       |
| Action            | <ul style="list-style-type: none"> <li>Cancel Key IGN Timer</li> <li>Key IGN Alarm Release On</li> <li>State does not change</li> </ul> |

### Condition 4

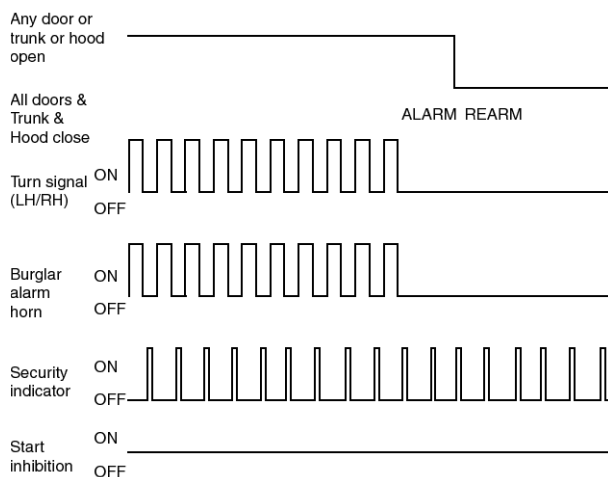
| State             | Description                                                                                                      |
|-------------------|------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>REARM STATE</li> <li>Alt L Off</li> </ul>                                 |
| Event             | Alt L On                                                                                                         |
| Action            | <ul style="list-style-type: none"> <li>Start ALT L Alarm Release Timer</li> <li>State does not change</li> </ul> |

### Condition 5

| State             | Description                                                                                                                                 |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>REARM STATE</li> <li>ALT L Alarm Release Timer <math>&lt;</math> ALT L Alarm Release Time</li> </ul> |
| Event             | Alt L Off                                                                                                                                   |
| Action            | <ul style="list-style-type: none"> <li>Cancel ALT L Alarm Release Timer</li> <li>State does not change</li> </ul>                           |

### Condition 6

| State             | Description                                                                                                                                   |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>REARM STATE</li> </ul>                                                                                 |
| Event             | ALT L Alarm Release Timer $\geq$ ALT L Alarm Release Time                                                                                     |
| Action            | <ul style="list-style-type: none"> <li>Cancel ALTLAlarmReleaseTimer</li> <li>Alt I Alarm Release On</li> <li>State does not change</li> </ul> |



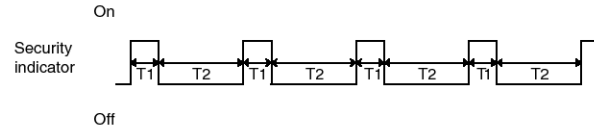
SVGBE0089L

# Keyless Entry And Burglar Alarm

## BE-163

### ALARM

- Alarm pattern: MID/China 1 time Alarm flashing and Horn Activation (Alarm On Time 1 time).
- Alarm pattern: GEN 3 times Alarm flashing and Horn Activation (Alarm On Time / Alarm Off Time, 3 time).
- Security IND is Blinking( 0.32sec/On : 2sec/Off),



T1 : 0.32 ± 0.032 sec,

T2 : 2 ± 0.2 sec

1. ARM to ALARM

### Condition 1

| State             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• ARM STATE</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                 |
| Event             | <ol style="list-style-type: none"> <li>1. Any Door is Open(Any Door Open On) or</li> <li>2. Hood is Open(Hood SW On) or</li> <li>3. Trunk is Open(Trunk Status On)</li> </ol>                                                                                                                                                                                                                                                                 |
| Action            | <ul style="list-style-type: none"> <li>• Start Alarm Flashing (Alarm Flasher On)</li> <li>• Start Alarm Buzzer (Burglar Alarm Horn On/ Horn On)</li> <li>• Start Alarm Timer</li> <li>• Engine Start Inhibition is On (Start Inhibition On)</li> <li>• Key IGN Alarm Release Off</li> <li>• Alt I Alarm Release Off</li> <li>• Cancel Key IGN Timer</li> <li>• Cancel ALT L Alarm Release Timer</li> <li>• State go to ALARM State</li> </ul> |

### Condition 2

| State             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• ARM STATE at China Option and Non Smart Key Option (Pic option Off &amp;&amp; China Option On)</li> </ul>                                                                                                                                                                                                                                                                                            |
| Event             | Key On                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Action            | <ul style="list-style-type: none"> <li>• Start Alarm Flashing (Alarm Flasher On)</li> <li>• Start Alarm Buzzer (Burglar Alarm Horn On/ Horn On)</li> <li>• Start Alarm Timer</li> <li>• Engine Start Inhibition is On (Start Inhibition On)</li> <li>• Key IGN Alarm Release Off</li> <li>• Alt I Alarm Release Off</li> <li>• Cancel Key IGN Timer</li> <li>• Cancel ALT L Alarm Release Timer</li> <li>• State go to ALARM State</li> </ul> |

**BE-164****Body Electrical System****Condition 3**

| State             | Description                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ARM STATE at China Option and Smart Key Option (Pic option On &amp;&amp; China Option On)</li> </ul>                                                                                                                                                                                                                                                                                 |
| Event             | Key In On or Fob In On                                                                                                                                                                                                                                                                                                                                                                                                      |
| Action            | <ul style="list-style-type: none"> <li>Start Alarm Flashing (Alarm Flasher On)</li> <li>Start Alarm Buzzer (Burglar Alarm Horn On/ Horn On)</li> <li>Start Alarm Timer</li> <li>Engine Start Inhibition is On (Start Inhibition On)</li> <li>Key IGN Alarm Release Off</li> <li>Alt I Alarm Release Off</li> <li>Cancel Key IGN Timer</li> <li>Cancel ALT L Alarm Release Timer</li> <li>State go to ALARM State</li> </ul> |

## 2. ARMHOLD to ALARM

**Condition 1**

| State             | Description                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ARMHOLD STATE</li> </ul>                                                                                                                                                                                                                                                                                                                                                             |
| Event             | <ol style="list-style-type: none"> <li>Any Door is Open (Any Door Open On) or</li> <li>Hood is Open (Hood SW On)</li> </ol>                                                                                                                                                                                                                                                                                                 |
| Action            | <ul style="list-style-type: none"> <li>Start Alarm Flashing (Alarm Flasher On)</li> <li>Start Alarm Buzzer (Burglar Alarm Horn On/ Horn On)</li> <li>Start Alarm Timer</li> <li>Engine Start Inhibition is On (Start Inhibition On)</li> <li>Key IGN Alarm Release Off</li> <li>Alt I Alarm Release Off</li> <li>Cancel Key IGN Timer</li> <li>Cancel ALT L Alarm Release Timer</li> <li>State go to ALARM State</li> </ul> |

# Keyless Entry And Burglar Alarm

## BE-165

### Condition 2

| State             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | ARMHOLD STATE at China Option and Non Smart Key Option<br>(Pic option Off && China Option On)                                                                                                                                                                                                                                                                                                                                                 |
| Event             | Key On                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Action            | <ul style="list-style-type: none"> <li>• Start Alarm Flashing (Alarm Flasher On)</li> <li>• Start Alarm Buzzer (Burglar Alarm Horn On/ Horn On)</li> <li>• Start Alarm Timer</li> <li>• Engine Start Inhibition is On (Start Inhibition On)</li> <li>• Key IGN Alarm Release Off</li> <li>• Alt I Alarm Release Off</li> <li>• Cancel Key IGN Timer</li> <li>• Cancel ALT L Alarm Release Timer</li> <li>• State go to ALARM State</li> </ul> |

### Condition 3

| State             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | ARMHOLD STATE at China Option and Smart Key Option<br>(Pic option Off && China Option On)                                                                                                                                                                                                                                                                                                                                                     |
| Event             | Key In On or Fob In On                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Action            | <ul style="list-style-type: none"> <li>• Start Alarm Flashing (Alarm Flasher On)</li> <li>• Start Alarm Buzzer (Burglar Alarm Horn On/ Horn On)</li> <li>• Start Alarm Timer</li> <li>• Engine Start Inhibition is On (Start Inhibition On)</li> <li>• Key IGN Alarm Release Off</li> <li>• Alt I Alarm Release Off</li> <li>• Cancel Key IGN Timer</li> <li>• Cancel ALT L Alarm Release Timer</li> <li>• State go to ALARM State</li> </ul> |



**BE-166****Body Electrical System**

## 3. REARM to ALARM

**Condition 1**

| State             | Description                                                                                                                                                                                                        |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>REARM STATE</li> </ul>                                                                                                                                                      |
| Event             | <ol style="list-style-type: none"> <li>Any Door is Open (Any Door Open On) or</li> <li>Hood is Open (Hood SW On) or</li> <li>Trunk is Open (Trunk Status On)</li> </ol>                                            |
| Action            | <ul style="list-style-type: none"> <li>Start Alarm Flashing (Alarm Flasher On)</li> <li>Start Alarm Buzzer (Burglar Alarm Horn On/ Horn On)</li> <li>Start Alarm Timer</li> <li>State go to ALARM State</li> </ul> |

**Condition 2**

| State             | Description                                                                                                                                                                                                        |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>REARM STATE at China Option and Non Smart Key Option (Pic option Off &amp;&amp; China Option On)</li> </ul>                                                                 |
| Event             | Key On                                                                                                                                                                                                             |
| Action            | <ul style="list-style-type: none"> <li>Start Alarm Flashing (Alarm Flasher On)</li> <li>Start Alarm Buzzer (Burglar Alarm Horn On/ Horn On)</li> <li>Start Alarm Timer</li> <li>State go to ALARM State</li> </ul> |

**Condition 3**

| State             | Description                                                                                                                                                                                                        |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>REARM STATE at China Option and Smart Key Option (Pic option Off &amp;&amp; China Option On)</li> </ul>                                                                     |
| Event             | Key In On or Fob In On                                                                                                                                                                                             |
| Action            | <ul style="list-style-type: none"> <li>Start Alarm Flashing (Alarm Flasher On)</li> <li>Start Alarm Buzzer (Burglar Alarm Horn On/ Horn On)</li> <li>Start Alarm Timer</li> <li>State go to ALARM State</li> </ul> |

## 4. ALARM to ALARM

**Condition 1**

| State             | Description                                                                                                                                                                                                                                                                   |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ALARM STATE</li> </ul>                                                                                                                                                                                                                 |
| Event             | Power RESET                                                                                                                                                                                                                                                                   |
| Action            | <ul style="list-style-type: none"> <li>Start Alarm Flashing (Alarm Flasher On)</li> <li>Start Alarm Buzzer (Burglar Alarm Horn On/ Horn On)</li> <li>Engine Start Inhibition is On (Start Inhibition On)</li> <li>Start Alarm Timer</li> <li>State does not change</li> </ul> |

# Keyless Entry And Burglar Alarm

## BE-167

### Condition 2

| State             | Description                                                                                                                                                                                                       |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ALARM STATE</li> </ul>                                                                                                                                                     |
| Event             | AlarmTimer $\geq$ AlarmTime                                                                                                                                                                                       |
| Action            | <ul style="list-style-type: none"> <li>Cancel AlarmTimer</li> <li>Stop Alarm Flashing (Alarm Flasher Off)</li> <li>Stop Alarm Buzzer (Burglar Alarm Horn Off/ Horn Off)</li> <li>State does not change</li> </ul> |

### Condition 3

| State             | Description                                                                                               |
|-------------------|-----------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ALARM STATE</li> <li>Key In Off or IGN1 Off or IGN2 Off</li> </ul> |
| Event             | Key In On & IGN1 On & IGN2 On                                                                             |
| Action            | <ul style="list-style-type: none"> <li>Start KeyIGNTimer</li> <li>State does not change</li> </ul>        |

### Condition 4

| State             | Description                                                                                            |
|-------------------|--------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ALARM STATE</li> <li>Key IGN Timer &lt; Key IGN Time</li> </ul> |
| Event             | Key In Off or IGN1 Off or IGN2 Off                                                                     |
| Action            | <ul style="list-style-type: none"> <li>Cancel Key IGN Timer</li> <li>State does not change</li> </ul>  |

### Condition 5

| State             | Description                                                                                                                             |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ALARM STATE</li> </ul>                                                                           |
| Event             | Key IGN Timer $\geq$ Key IGN Time                                                                                                       |
| Action            | <ul style="list-style-type: none"> <li>Cancel Key IGN Timer</li> <li>Key IGN Alarm Release On</li> <li>State does not change</li> </ul> |

### Condition 6

| State             | Description                                                                                                      |
|-------------------|------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ALARM STATE</li> <li>Alt L Off</li> </ul>                                 |
| Event             | Alt L On                                                                                                         |
| Action            | <ul style="list-style-type: none"> <li>Start ALT L Alarm Release Timer</li> <li>State does not change</li> </ul> |

# BE-168

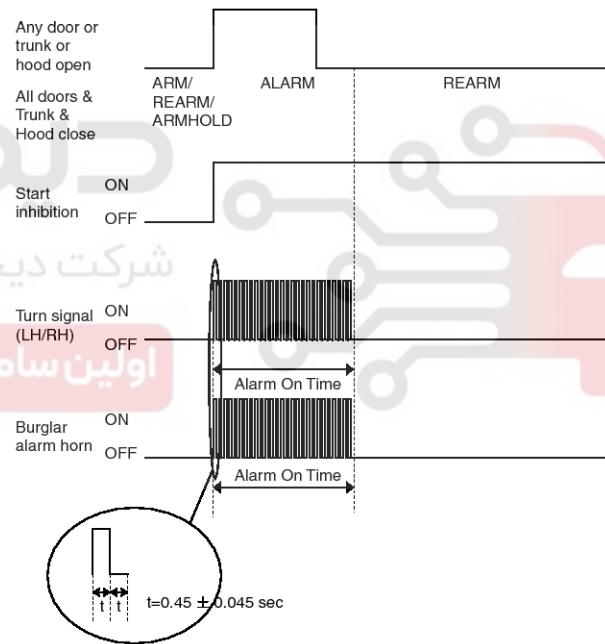
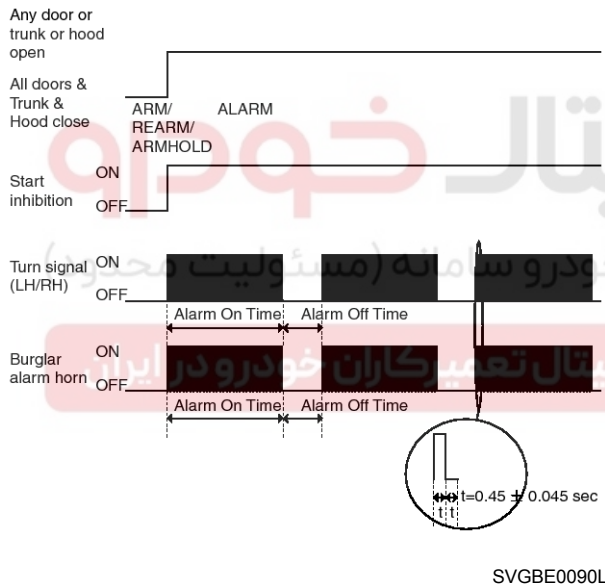
# Body Electrical System

## Condition 7

| State             | Description                                                                                                                    |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ALARM STATE</li> <li>ALT L Alarm Release Timer &lt; ALT L Alarm Release Time</li> </ul> |
| Event             | Alt L Off                                                                                                                      |
| Action            | <ul style="list-style-type: none"> <li>Cancel ALT L Alarm Release Timer</li> <li>State does not change</li> </ul>              |

## Condition 8

| State             | Description                                                                                                                                       |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>ALARM STATE</li> </ul>                                                                                     |
| Event             | ALT L Alarm Release Timer ≥ ALT L Alarm Release Time                                                                                              |
| Action            | <ul style="list-style-type: none"> <li>Cancel ALT L Alarm Release Timer</li> <li>Alt I Alarm Release On</li> <li>State does not change</li> </ul> |



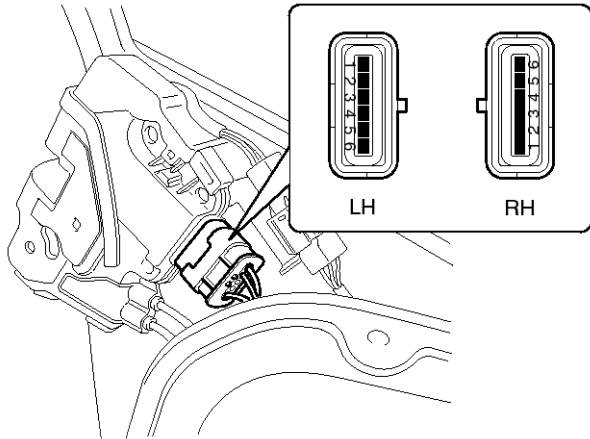
# Keyless Entry And Burglar Alarm

# BE-169

## Inspection

### Front Door Lock Actuator Inspection

1. Remove the front door trim.  
(Refer to the BD group - "Front door")
2. Remove the front door module.
3. Disconnect the 6P connector from the actuator.



SVGBE0092L

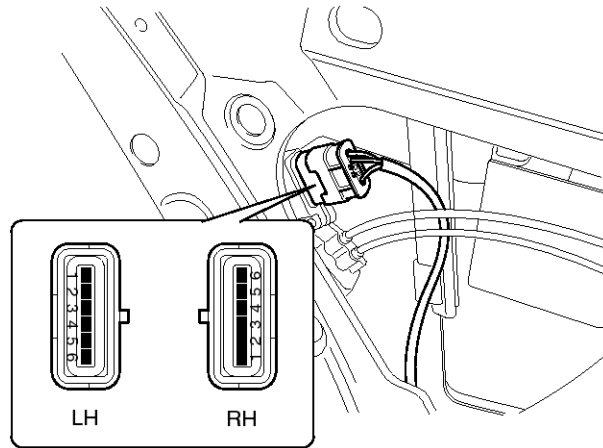
4. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

| Position    |        | Terminal 2 | Terminal 1 |
|-------------|--------|------------|------------|
| Front left  | Lock   | ⊕          | ⊖          |
|             | Unlock | ⊖          | ⊕          |
| Position    |        | Terminal 6 | Terminal 5 |
| Front right | Lock   | ⊕          | ⊖          |
|             | Unlock | ⊖          | ⊕          |

SVGBE0094L

### Rear Door Lock Actuator Inspection

1. Remove the rear door trim.  
(Refer to the BD group - "Rear door")
2. Remove the rear door module.
3. Disconnect the 6P connector from the actuator.



SVGBE0093L

4. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

| Position   |        | Terminal 2 | Terminal 1 |
|------------|--------|------------|------------|
| Rear left  | Lock   | ⊕          | ⊖          |
|            | Unlock | ⊖          | ⊕          |
| Position   |        | Terminal 6 | Terminal 5 |
| Rear right | Lock   | ⊕          | ⊖          |
|            | Unlock | ⊖          | ⊕          |

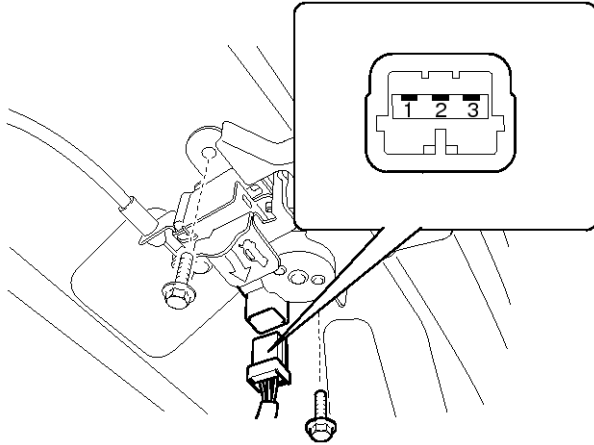
SVGBE0095L

# BE-170

# Body Electrical System

## Trunk Lid Release Actuator Inspection

1. Remove the trunk lid trim panel.  
(Refer to the BD group - "Trunk lid")
2. Disconnect the 3P connector from the actuator.



SVGBE0136D

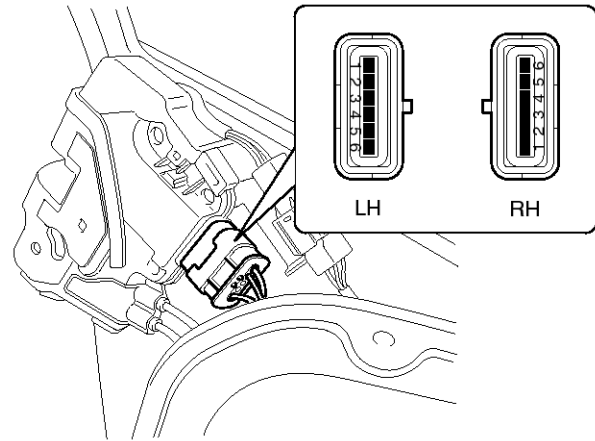
3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

| Position \ Terminal | 1 | 2 |
|---------------------|---|---|
| Open                | ⊖ | ⊕ |
| Close               | — | — |

SVGBE0096L

## Front Door Lock Switch Inspection

1. Remove the front door trim panel.  
(Refer to the BD group - "Front door")
2. Remove the front door module.
3. Disconnect the 6P connector from the actuator.



SVGBE0092L

4. Check for continuity between the terminals in each switch position when inserting the key into the door according to the table.

| Position \ Terminal  | 5     | 6     |
|----------------------|-------|-------|
| Front Left \ Unlock  | ○ — ○ | ○ — ○ |
| Position \ Terminal  | 1     | 2     |
| Front Right \ Unlock | ○ — ○ | ○ — ○ |

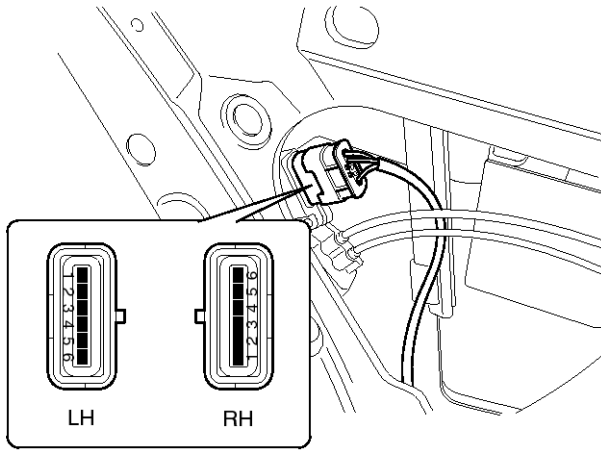
SVGBE0097L

# Keyless Entry And Burglar Alarm

# BE-171

## Rear Door Lock Switch Inspection

1. Remove the rear door trim panel.  
(Refer to the BD group - "Rear door")
2. Remove the rear door module.
3. Disconnect the 6P connector from the actuator.



SVGBE0093L

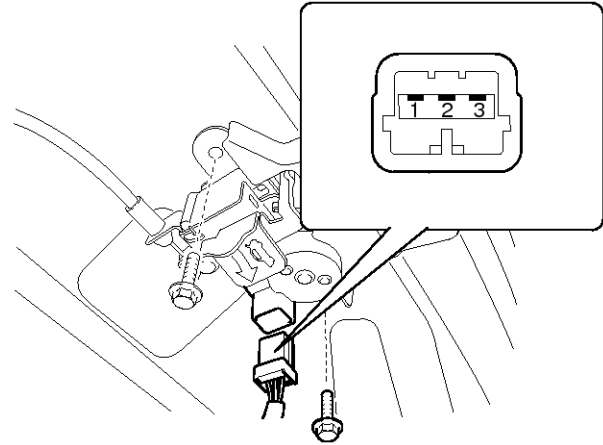
4. Check for continuity between the terminals in each switch position according to the table.

|            |        | Terminal |       |
|------------|--------|----------|-------|
|            |        | 5        | 6     |
| Rear Left  | Unlock | ○ — ○    | ○ — ○ |
| Rear Right | Unlock | ○ — ○    | ○ — ○ |

SVGBE0098L

## Trunk Lid Open Switch Inspection

1. Remove the trunk lid trim.  
(Refer to the BD group - "Trunk lid")
2. Disconnect the 3P connector from the actuator.



SVGBE0136D

3. Check for continuity between the terminals in each switch position according to the table.

|       |  | Terminal |       |
|-------|--|----------|-------|
|       |  | 1        | 3     |
| Open  |  | ○ — ○    | ○ — ○ |
| Close |  |          |       |

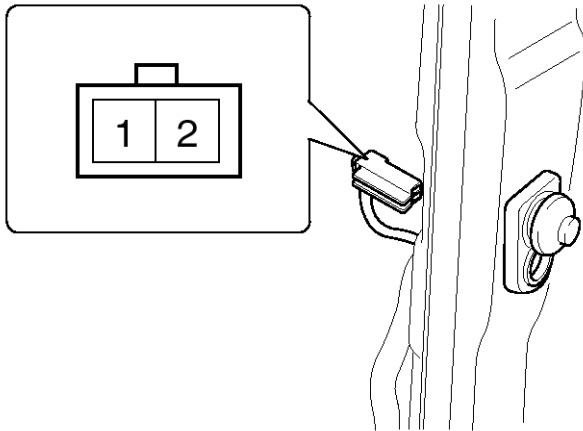
SVGBE0099L

# BE-172

# Body Electrical System

## Door Switch Inspection

Remove the door switch and check for continuity between the terminals.



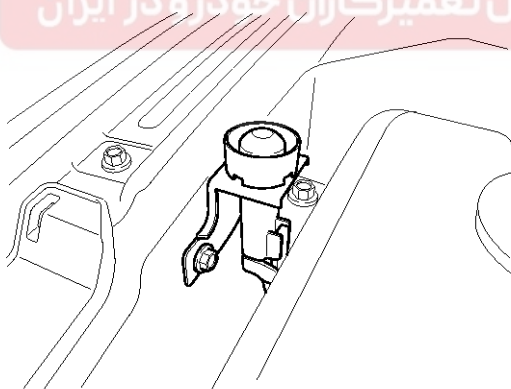
SHMBE8125D

| Terminal<br>Position | 1 | 2 | Body<br>(Ground) |
|----------------------|---|---|------------------|
| Free(Door open)      | ○ | ○ | ○                |
| Push(Door close)     |   |   |                  |

ETQF180D

## Hood Switch Inspection

1. Disconnect the connector from the hood switch (A).



SVGBE0139D

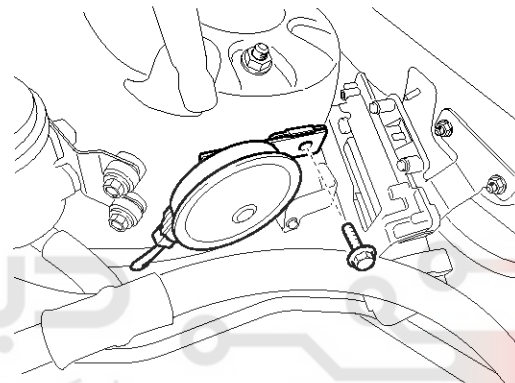
2. Check for continuity between the terminals and ground according to the table.

| Terminal<br>Position | 2 | 1 |
|----------------------|---|---|
| Hood open (Free)     | ○ | ○ |
| Hood close (Push)    |   |   |

SMGBE9050L

## Burglar Horn Inspection

1. Remove the burglar horn (A) after removing 1 bolt and disconnect the 2P connector from the burglar horn.



SVGBE0140D

2. Test the burglar horn by connecting battery power to the terminal 1 and ground the terminal 2.
3. The burglar horn should make a sound. If the burglar horn fails to make a sound replace it.



# Keyless Entry And Burglar Alarm

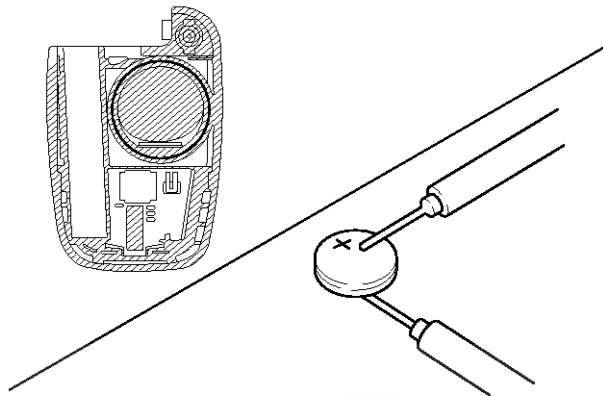
## BE-173

### Transmitter

#### Inspection

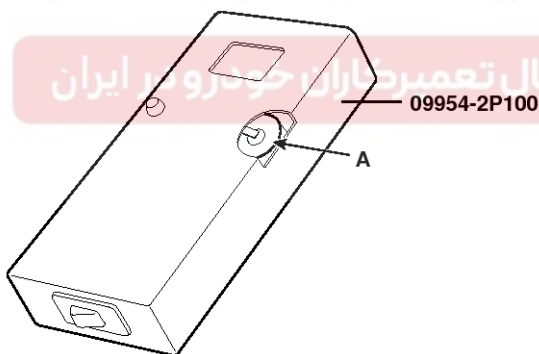
1. Check that the red light flickers when the door lock or unlock button is pressed on the transmitter.
2. Remove the battery (A) and check voltage if the red light doesn't flicker.

Standard voltage : 3V



SHMBE8129D

3. Insert the battery (A) into the tester (09954-2p100).



SVGBE0378D

4. Push the test button and If "0.00" is displayed on screen, it means that the battery voltage is 2V or less.
5. If "L" is displayed on screen, it means that the battery is low power and it needs to replace.

6. To prevent the discharge of electricity, turn the tester power off.
7. Replace the transmitter battery with a new one, if voltage is low power then try to lock and unlock the doors with the transmitter by pressing the lock or unlock button five or six times.
8. If the doors lock and unlock, the transmitter is O.K, but if the doors don't lock and unlock, register the transmitter code, then try to lock and unlock the doors.
9. If the doors lock and unlock, the transmitter is O.K, but if the doors don't lock and unlock, replace the transmitter.

#### ⚠WARNING

An inappropriately disposed battery can be harmful to the environment and human health.

Dispose the battery according to your local law(s) or regulation.

#### Transmitter Code Registration (Using Code Saver)

1. Open Door.
2. Connect POWER (B+) and GND, signal line of Code Saver.
3. If connection is normal, signal line is activated and RED LED turns ON.
4. If switch of Code Saver turns ON, data via signal line will be transmitted.
5. BCM enters into Code Save mode when it receives data from Code Saver and send Code Save Start signal via signal line.
6. Code Saver turns Green LED ON when it receives Code Save Start signal.
7. When you press Lock or Unlock button of transmitter, BCM will save Codes.
8. If there are 2 transmitters for Code Saving, register by performing item 7).
9. If switch of Code Saver turns OFF or is disconnected, Code Saving mode will be finished.

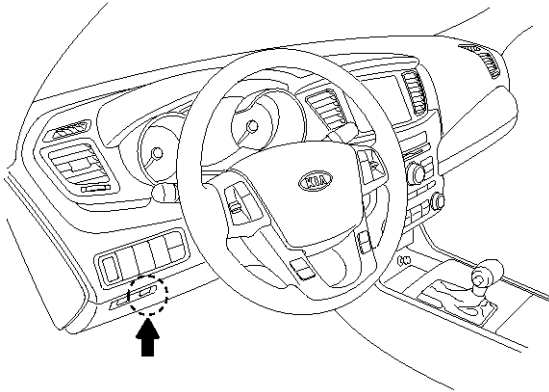
# BE-174

# Body Electrical System

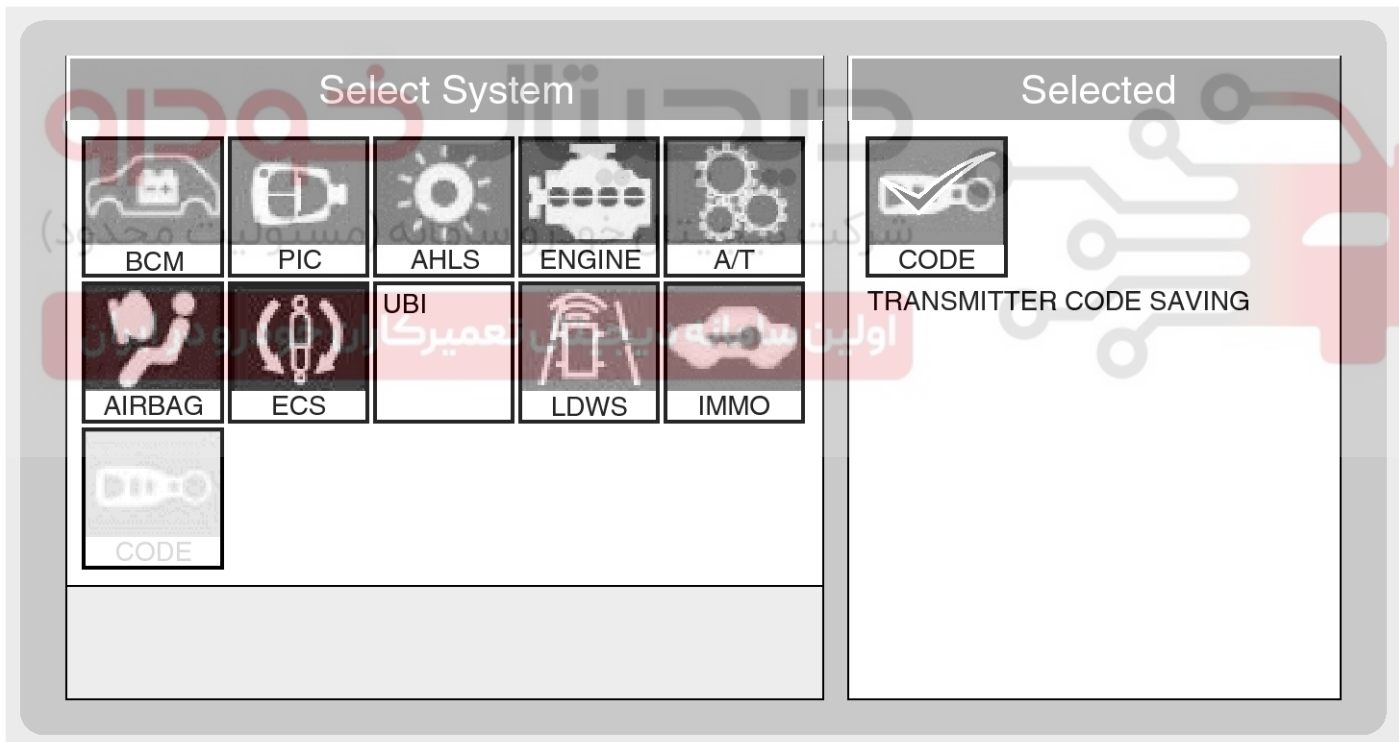
## Transmitter Code Registration (Using GDS)

1. Connect the DLC cable of GDS to the data link connector (16 pins) in driver side crash pad lower panel, turn the power on GDS.

2. Select the vehicle model and then do "CODE SAVING"



SVGBE0085D



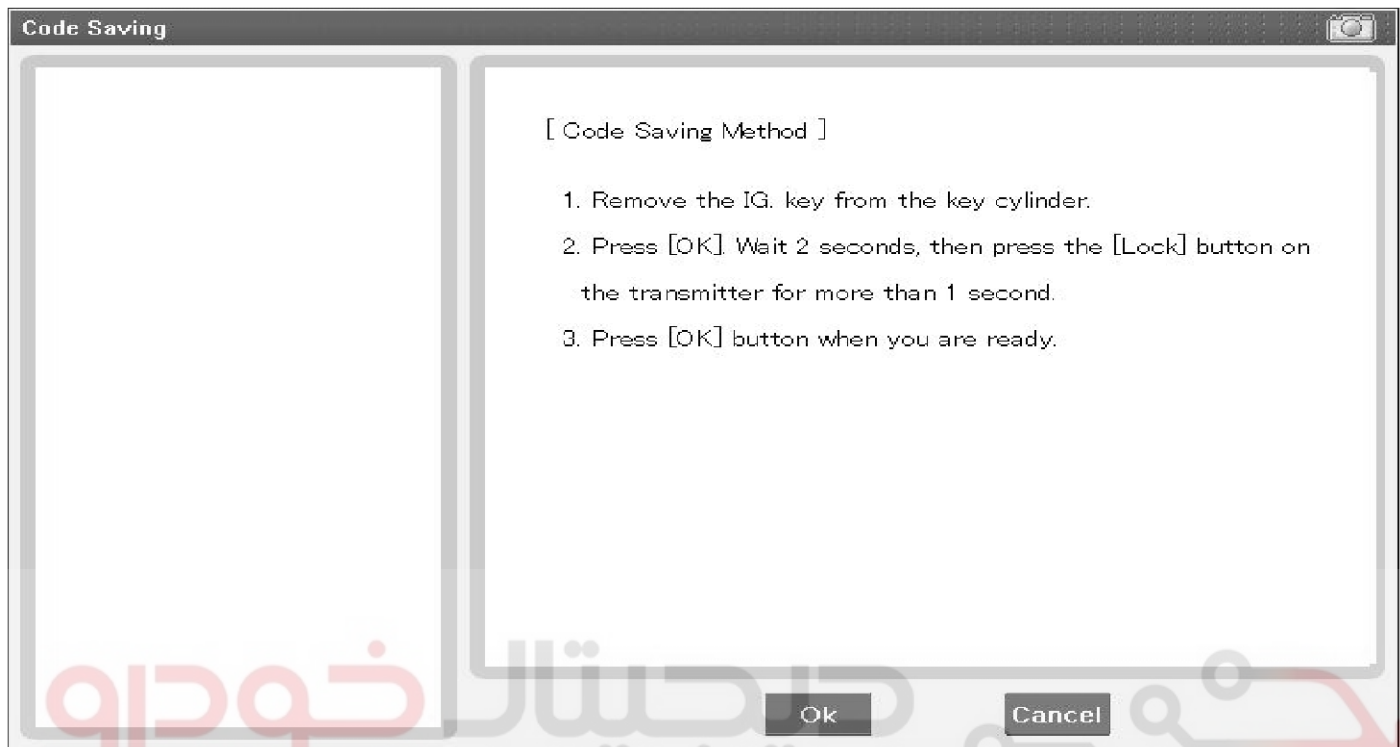
The screenshot shows the GDS software interface. On the left, the 'Select System' menu is displayed with a grid of icons and labels: BCM, PIC, AHLS, ENGINE, A/T, AIRBAG, ECS, UBI, LDWS, IMMO, and CODE. The 'CODE' option is highlighted. On the right, the 'Selected' screen shows a checkmark icon and the text 'TRANSMITTER CODE SAVING'.

SVGBE0234L

# Keyless Entry And Burglar Alarm

**BE-175**

3. After selecting "CODE SAVING" menu, button "ENTER" key, then the screen will be shown as below.



شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

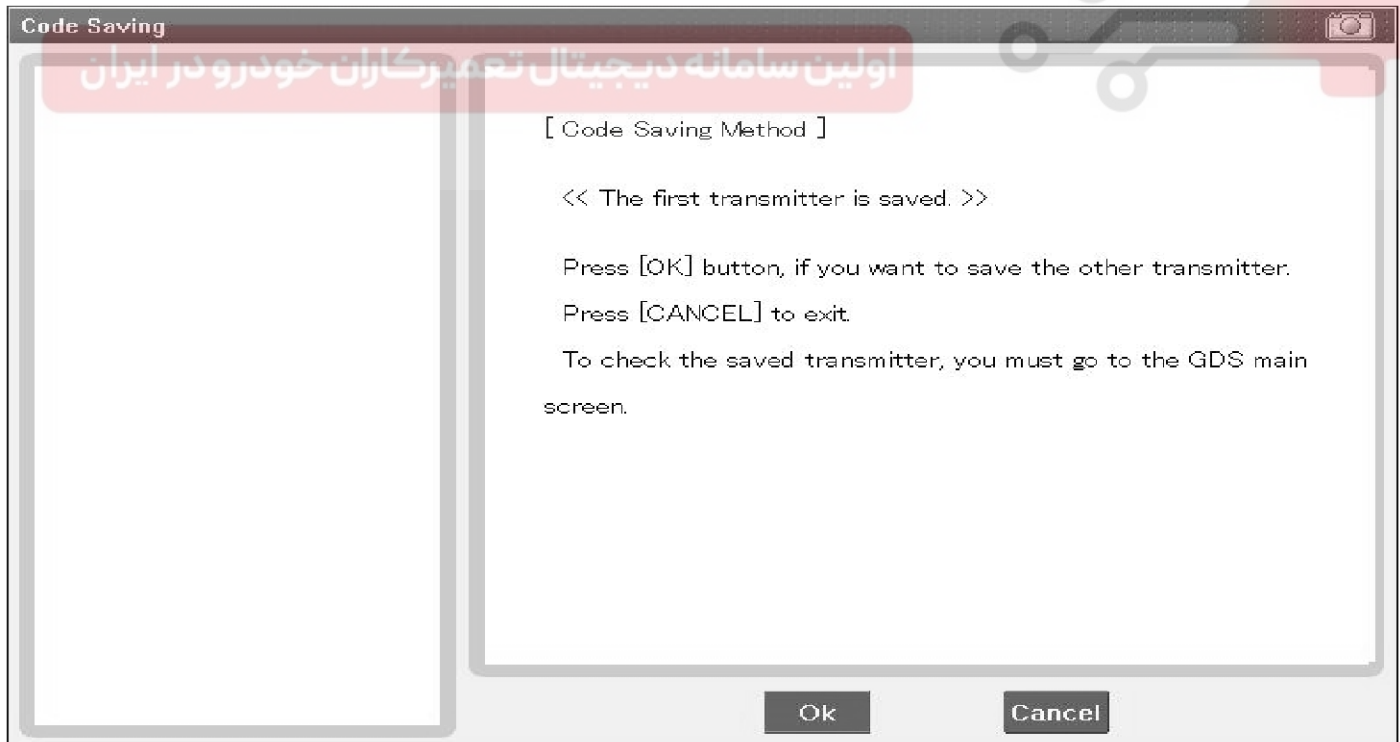
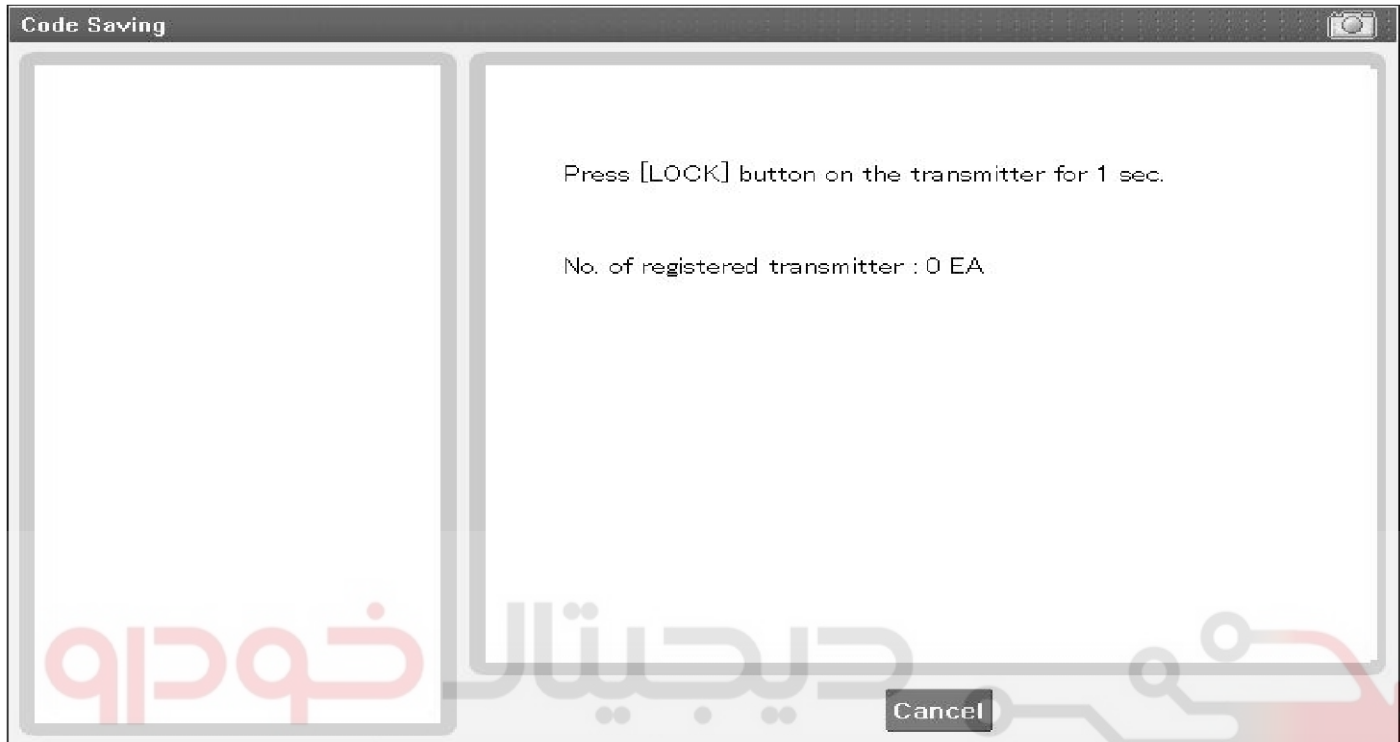
SBKBE9091N

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

## BE-176

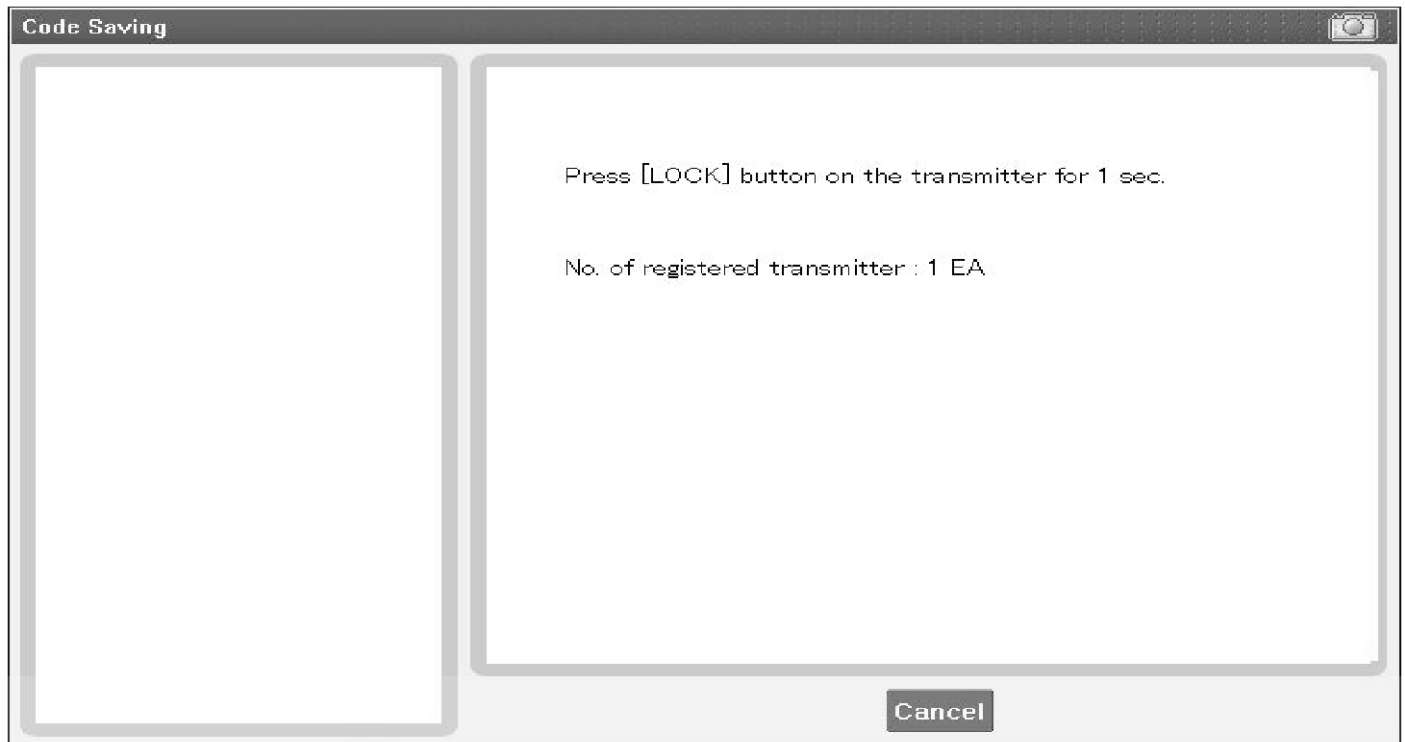
## Body Electrical System

4. After removing the ignition key from key cylinder, push "ENTER" key to proceed to the next mode for code saving. Follow steps 1 to 4 and then code saving is completed.

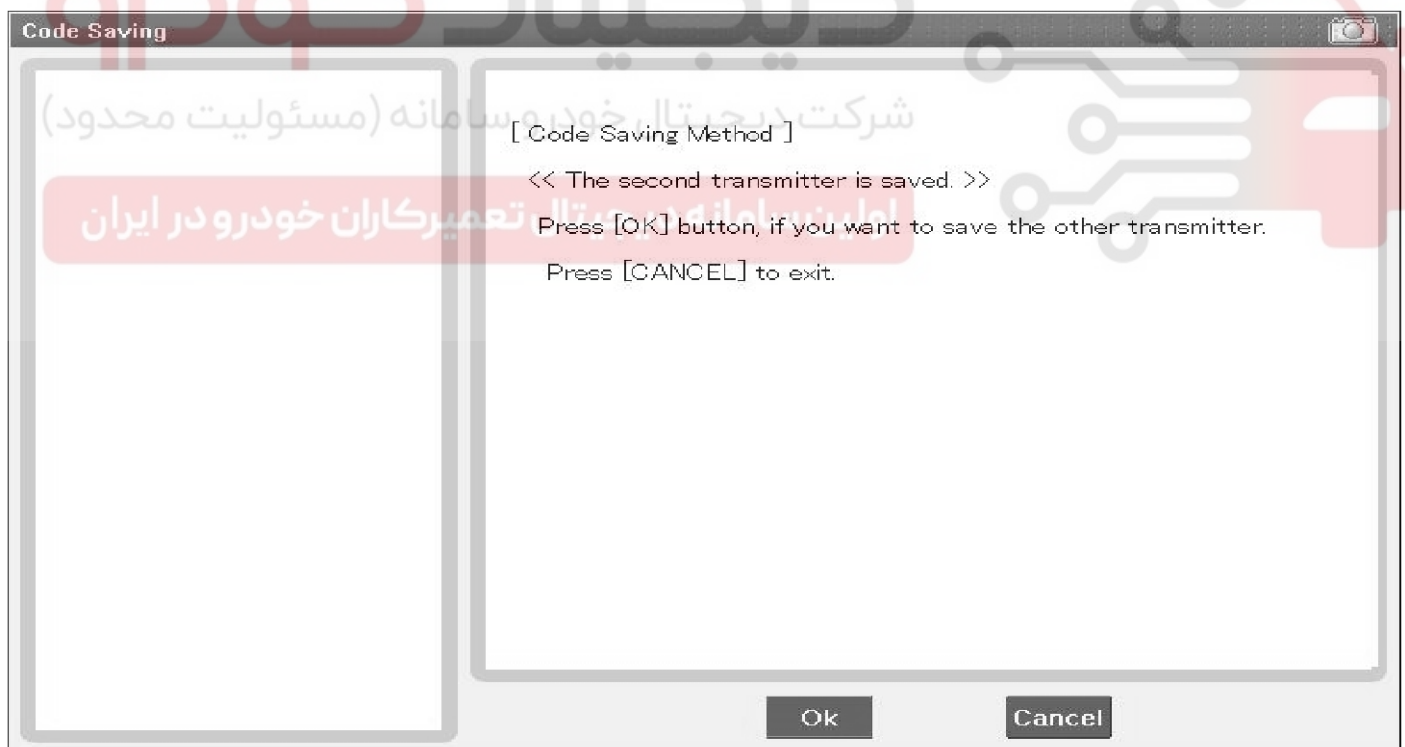


# Keyless Entry And Burglar Alarm

# BE-177



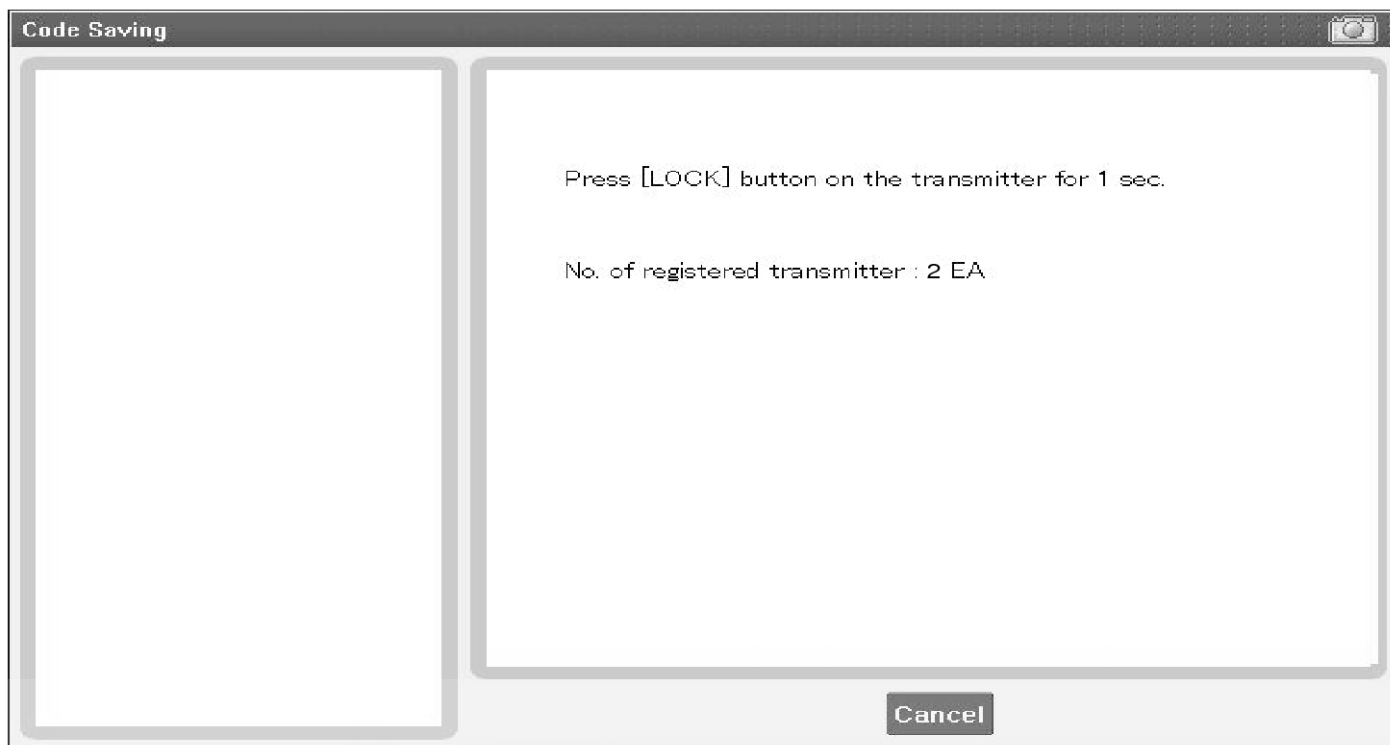
SBKBE9094N



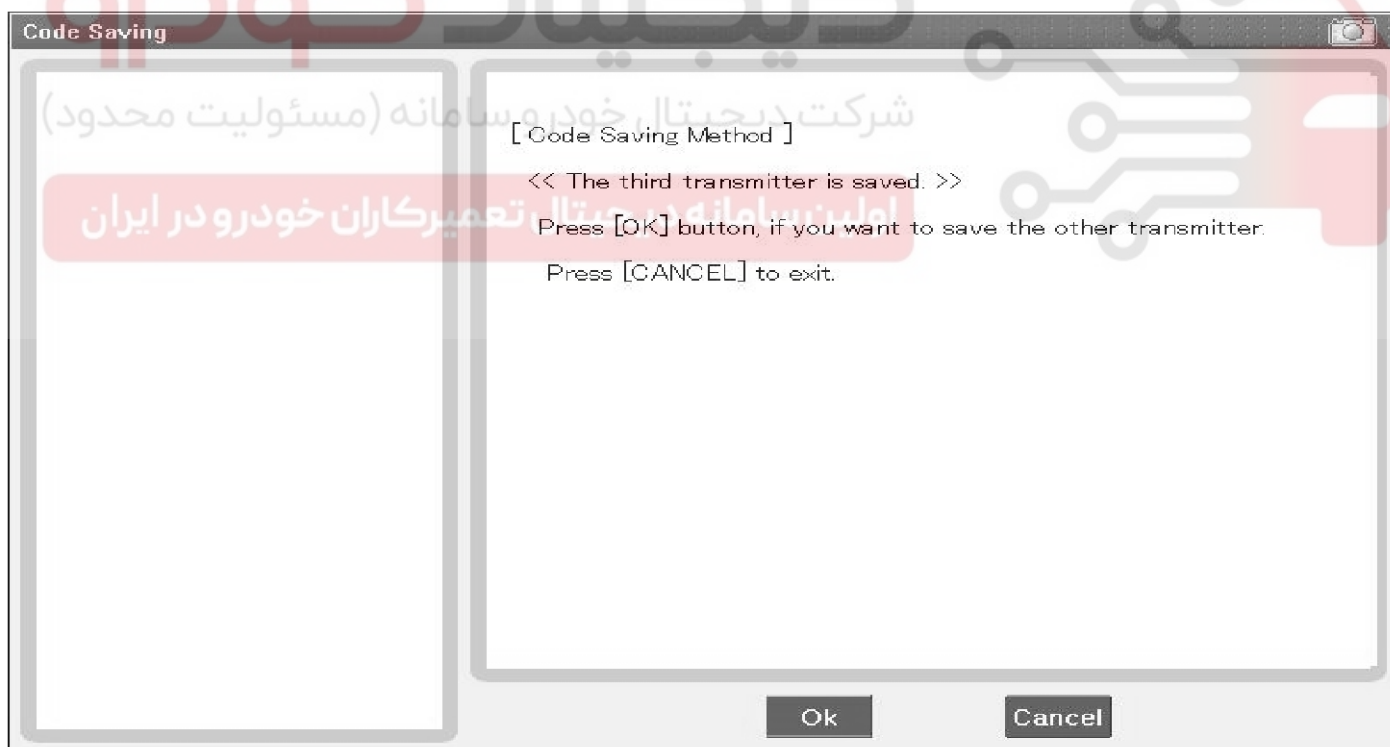
SBKBE9095N

# BE-178

# Body Electrical System



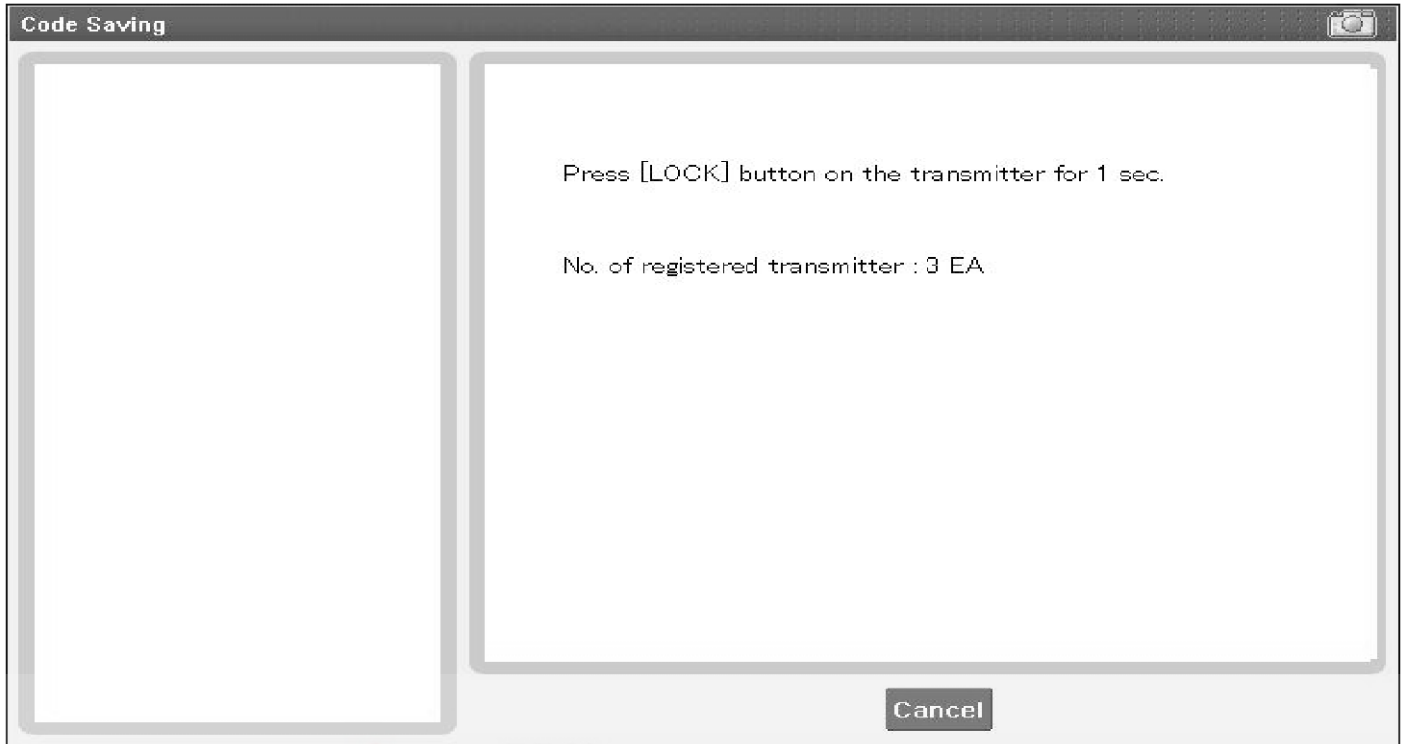
SBKBE9096N



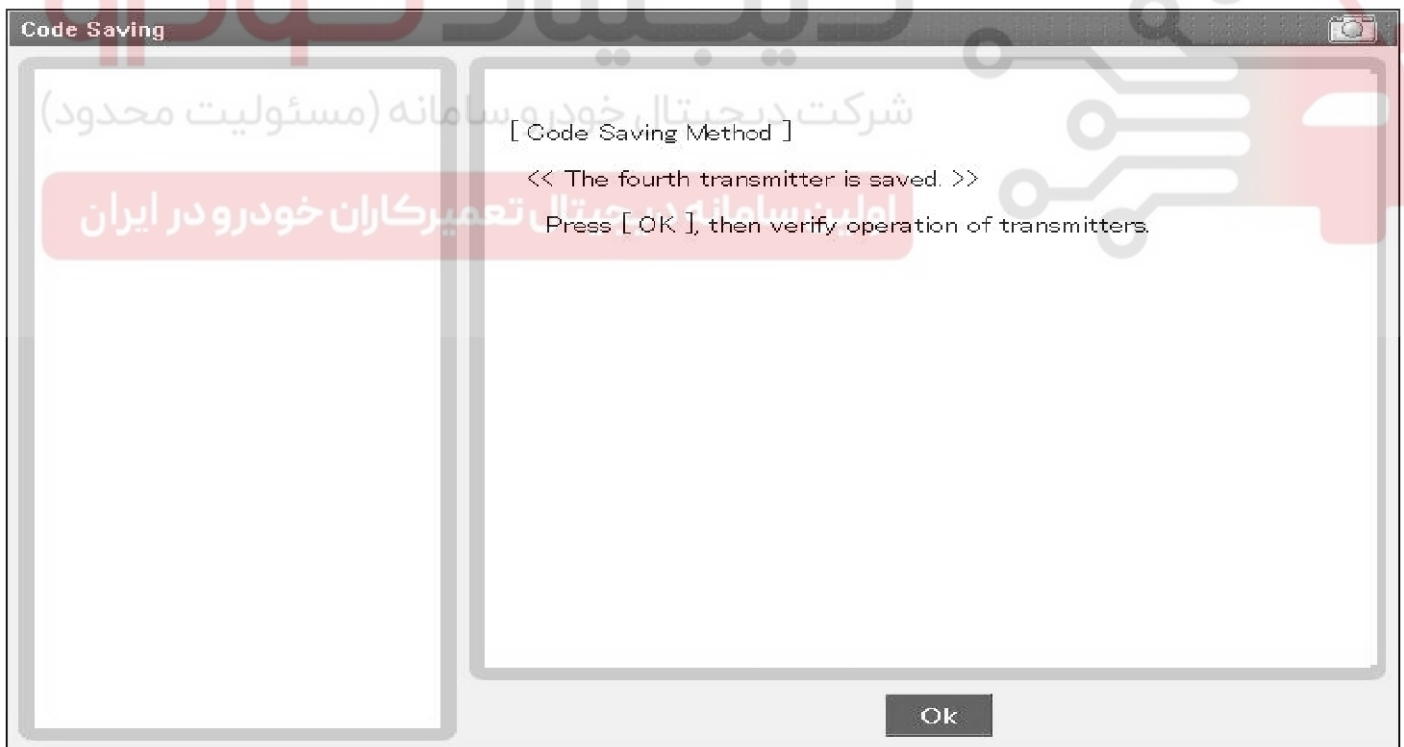
SBKBE9097N

# Keyless Entry And Burglar Alarm

# BE-179



SBKBE9098N

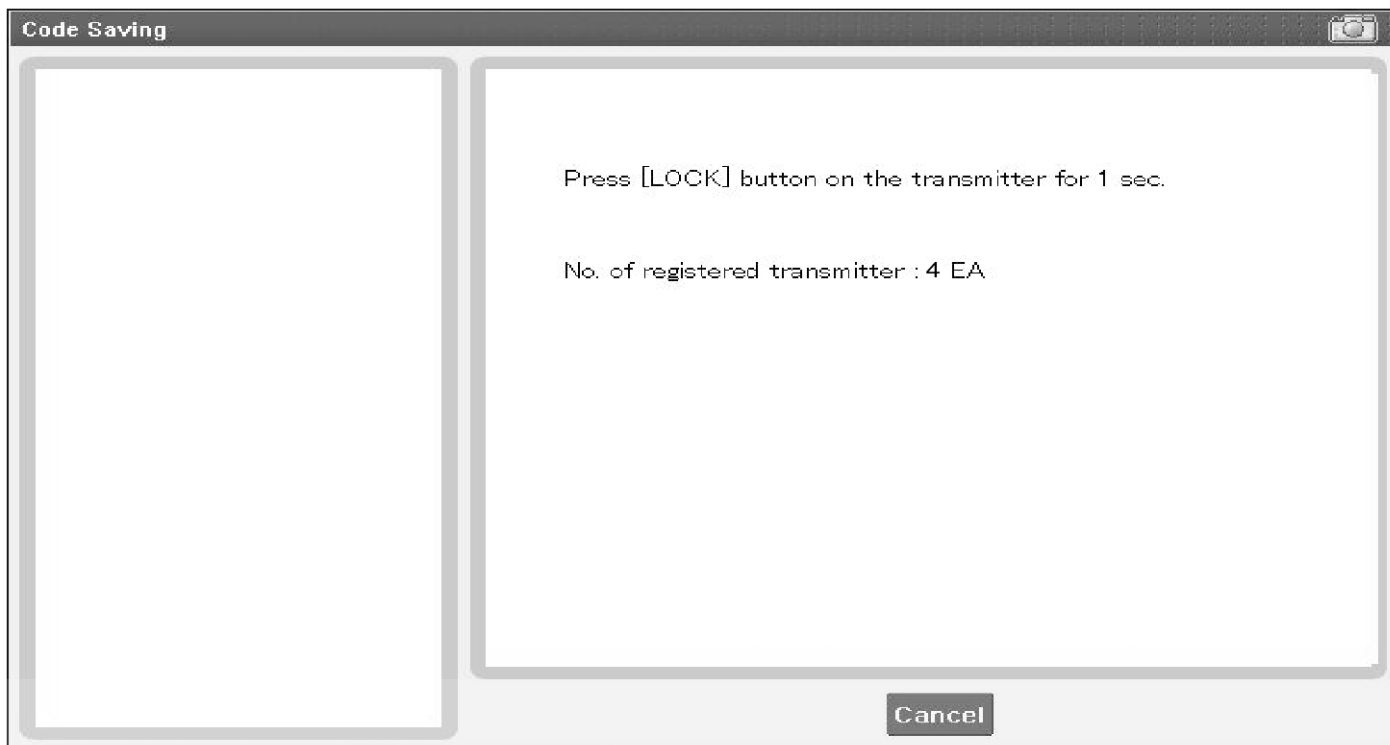


SBKBE9099N



# BE-180

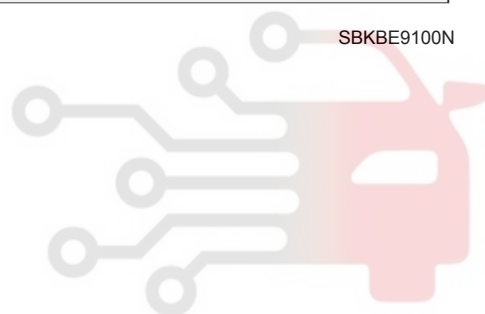
# Body Electrical System



# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



# BCM (Body Control Module)

BE-181

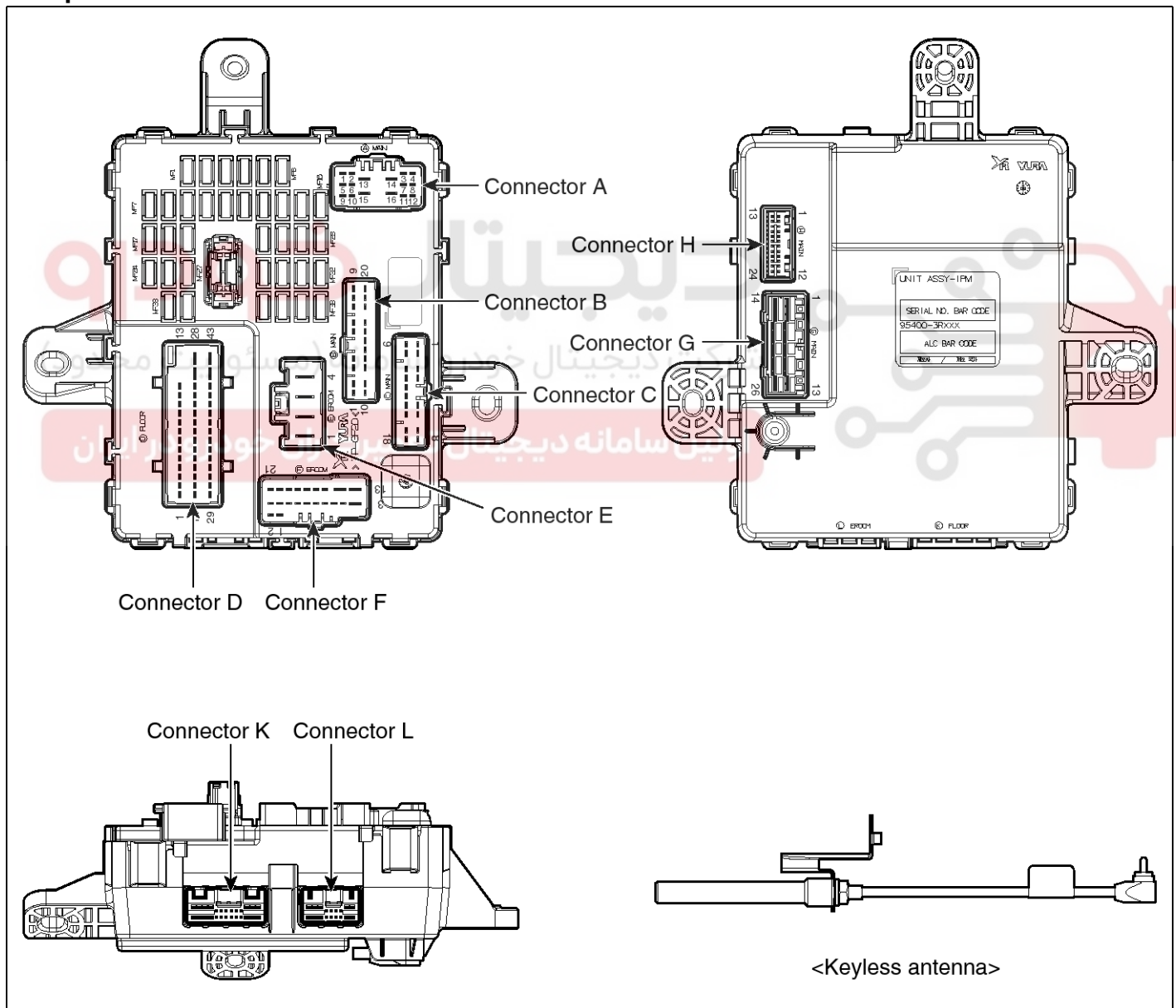
## BCM (Body Control Module)

### Body Control Module (BCM)

#### Specifications

| Items                 | Specifications           |
|-----------------------|--------------------------|
| Rated voltage         | DC 12V                   |
| Operating voltage     | DC 9 ~ 16V               |
| Operating temperature | -22°F~167°F(-30°C~ 75°C) |
| Dark current          | 4.5mA                    |

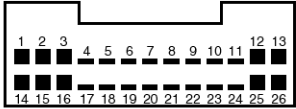
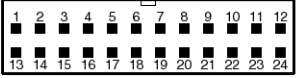
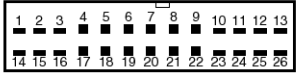
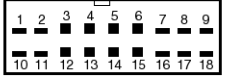
#### Components



SVGBE0100L

BE-182

Body Electrical System

|         |  |  |  |  |
|---------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Pin NO. | Connector G                                                                       | Connector H                                                                       | Connector K                                                                        | Connector L                                                                         |
| 1       | Power ground                                                                      | Fog lamp switch                                                                   | -                                                                                  | Front turn right signal                                                             |
| 2       | -                                                                                 | Washer switch                                                                     | -                                                                                  | Wiper speed low                                                                     |
| 3       | Security indicator                                                                | Rear defogger switch                                                              | Rear right power window down                                                       | Horn relay                                                                          |
| 4       | Assistant seat belt switch                                                        | Auto light switch                                                                 | Rear left power window down                                                        | Hood switch                                                                         |
| 5       | Head lamp washer                                                                  | Tail lamp switch                                                                  | P Position signal                                                                  | -                                                                                   |
| 6       | Speed control wiper                                                               | Turn signal switch (LH)                                                           | Rear right door switch                                                             | Break leveling switch                                                               |
| 7       | -                                                                                 | Diagnosis line                                                                    | Rear left door switch                                                              | HID option signal                                                                   |
| 8       | -                                                                                 | -                                                                                 | Trunk state                                                                        | -                                                                                   |
| 9       | Auto cut relay                                                                    | MTS Data input                                                                    | External trunk switch                                                              | Wiper stop state                                                                    |
| 10      | Auto right sensor                                                                 | Vehicle information                                                               | Rain sensor input                                                                  | Front turn left signal                                                              |
| 11      | Auto right ground                                                                 | Key IN                                                                            | Driver seat belt switch                                                            | Wiper speed high                                                                    |
| 12      | AV Tail                                                                           | -                                                                                 | -                                                                                  | -                                                                                   |
| 13      | Signal ground                                                                     | Head lamp high beam switch                                                        | Rear right turn signal lamp                                                        | Rain sensor option                                                                  |
| 14      | Key solenoid                                                                      | Wiper INT switch                                                                  | Rear power window power                                                            | -                                                                                   |
| 15      | Key hole Illumination                                                             | B CAN Low                                                                         | -                                                                                  | -                                                                                   |
| 16      | Head lamp leveling manual control                                                 | B CAN High                                                                        | Rear right power window up                                                         | -                                                                                   |
| 17      | -                                                                                 | Wiper MIST Switch                                                                 | Rear left power window up                                                          | -                                                                                   |
| 18      | -                                                                                 | Turn signal switch (RH)                                                           | Driver door switch                                                                 | External buzzer                                                                     |
| 19      | Trunk release                                                                     | Parking break switch                                                              | Assistant door switch                                                              |                                                                                     |
| 20      | Auto light power                                                                  | -                                                                                 | -                                                                                  |                                                                                     |
| 21      | Cluster (Parking break lamp)                                                      | Head lamp low beam signal                                                         | Rear right door unlock switch                                                      |                                                                                     |
| 22      | -                                                                                 | Head lamp low beam switch                                                         | Rear left door unlock switch                                                       |                                                                                     |
| 23      | Navigation unit                                                                   | Hazard lamp switch                                                                | Rain sensor output                                                                 |                                                                                     |
| 24      | Burglar alarm horn relay                                                          | -                                                                                 | -                                                                                  |                                                                                     |
| 25      | Mood lamp                                                                         |                                                                                   | Room lamp                                                                          |                                                                                     |
| 26      | Assistant seat belt indicator                                                     |                                                                                   | Rear right turn signal                                                             |                                                                                     |

SVGBE0101L

**BCM (Body Control Module)****BE-183****BCM Connector Terminals****BCM(IPM) Input Signal SPEC**

| Pin NO. | Description                | Input characteristics                                   | Input voltage      |
|---------|----------------------------|---------------------------------------------------------|--------------------|
| -       | ACC                        | Pull down(ON:VB,OFF:Open)                               | Min:7V<br>Max17.5V |
| -       | IGN1                       | Pull down(Analog.)(B+ Back up line)<br>(ON:VB,OFF:Open) | Min:7V<br>Max17.5V |
| -       | BATT                       | Pull down(Analog.)(ON:VB,OFF:Open)                      | -                  |
| -       | IGN2                       | Pull down(ON:VB,OFF:Open)                               | Min:7V<br>Max17.5V |
| G4      | Assistant seat belt switch | Pull up(Unbelt:Ground,Belt:Open)                        | Min:7V<br>Max17.5V |
| G6      | Speed control wiper        | Pull up(Analog.)                                        | Min:7V<br>Max17.5V |
| G10     | Auto light sensor          | Pull down(Analog.)                                      | Min:7V<br>Max17.5V |
| H1      | Fog lamp switch            | Pull up(ON:Ground,OFF:Open)                             | Min:7V<br>Max17.5V |
| H2      | Washer switch              | Pull down(ON:VB,OFF:Open)                               | Min:7V<br>Max17.5V |
| H3      | Rear defogger switch       | Pull up(ON:Ground,OFF:Open)                             | Min:7V<br>Max17.5V |
| H4      | Auto right switch          | Pull up(ON:Ground,OFF:Open)                             | Min:7V<br>Max17.5V |
| H5      | Tail lamp switch           | Pull up(ON:Ground,OFF:Open)                             | Min:7V<br>Max17.5V |
| H6      | Turn signal switch (LH)    | Pull up(ON:Ground,OFF:Open)                             | Min:7V<br>Max17.5V |
| H9      | MTS Data input             | Pull up                                                 | Min:7V<br>Max17.5V |
| H11     | Key IN                     | Pull up(ON:Ground,OFF:Open)                             | Min:7V<br>Max17.5V |
| H13     | Head lamp high beam switch | Pull up(ON:Ground,OFF:Open)                             | Min:7V<br>Max17.5V |
| H14     | Wiper INT switch           | Pull down(ON:VB,OFF:Open)                               | Min:7V<br>Max17.5V |
| H17     | Wiper MIST Switch          | Pull down(ON:VB,OFF:Open)                               | Min:7V<br>Max17.5V |
| H18     | Turn signal switch (RH)    | Pull up(ON:Ground,OFF:Open)                             | Min:7V<br>Max17.5V |
| H19     | Parking break switch       | Pull up(ON:Ground,OFF:Open)                             | Min:7V<br>Max17.5V |

## BE-184

## Body Electrical System

| Pin NO. | Description                   | Input characteristics            | Input voltage      |
|---------|-------------------------------|----------------------------------|--------------------|
| H22     | Head lamp low beam switch     | Pull up(ON:Ground,OFF:Open)      | Min:7V<br>Max17.5V |
| H23     | Hazard lamp switch            | Pull up(ON:Ground,OFF:Open)      | Min:7V<br>Max17.5V |
| K5      | P Position signal             | Pull up(ON:Ground,OFF:Open)      | Min:7V<br>Max17.5V |
| K6      | Rear right door switch        | Pull up(ON:Ground,OFF:Open)      | Min:7V<br>Max17.5V |
| K7      | Rear left door switch         | Pull up(ON:Ground,OFF:Open)      | Min:7V<br>Max17.5V |
| K8      | Trunk state                   | Pull up(ON:Ground,OFF:Open)      | Min:7V<br>Max17.5V |
| K9      | External trunk switch         | Pull up(ON:Ground,OFF:Open)      | Min:7V<br>Max17.5V |
| K10     | Rain sensor input             | Pull up                          | Min:7V<br>Max17.5V |
| K11     | Driver seat belt switch       | Pull up(Unbelt:Ground,Belt:Open) | Min:7V<br>Max17.5V |
| K18     | Driver door switch            | Pull up(ON:Ground,OFF:Open)      | Min:7V<br>Max17.5V |
| K19     | Assistant door switch         | Pull up(ON:Ground,OFF:Open)      | Min:7V<br>Max17.5V |
| K21     | Rear right door unlock switch | -                                | Min:7V<br>Max17.5  |
| K22     | Rear left door unlock switch  | -                                | Min:7V<br>Max17.5V |
| L4      | Hood switch                   | Pull up (ON:Ground,OFF:Open)     | Min:7V<br>Max17.5V |
| L7      | HID option signal             | Pull up (ON:Ground,OFF:Open)     | Min:7V<br>Max17.5V |
| L9      | Wiper stop state              | Pull up(ON:Ground,OFF:Open)      | Min:7V<br>Max17.5V |
| L13     | Rain sensor option            | Pull up (ON:Ground,OFF:Open)     | Min:7V<br>Max17.5V |

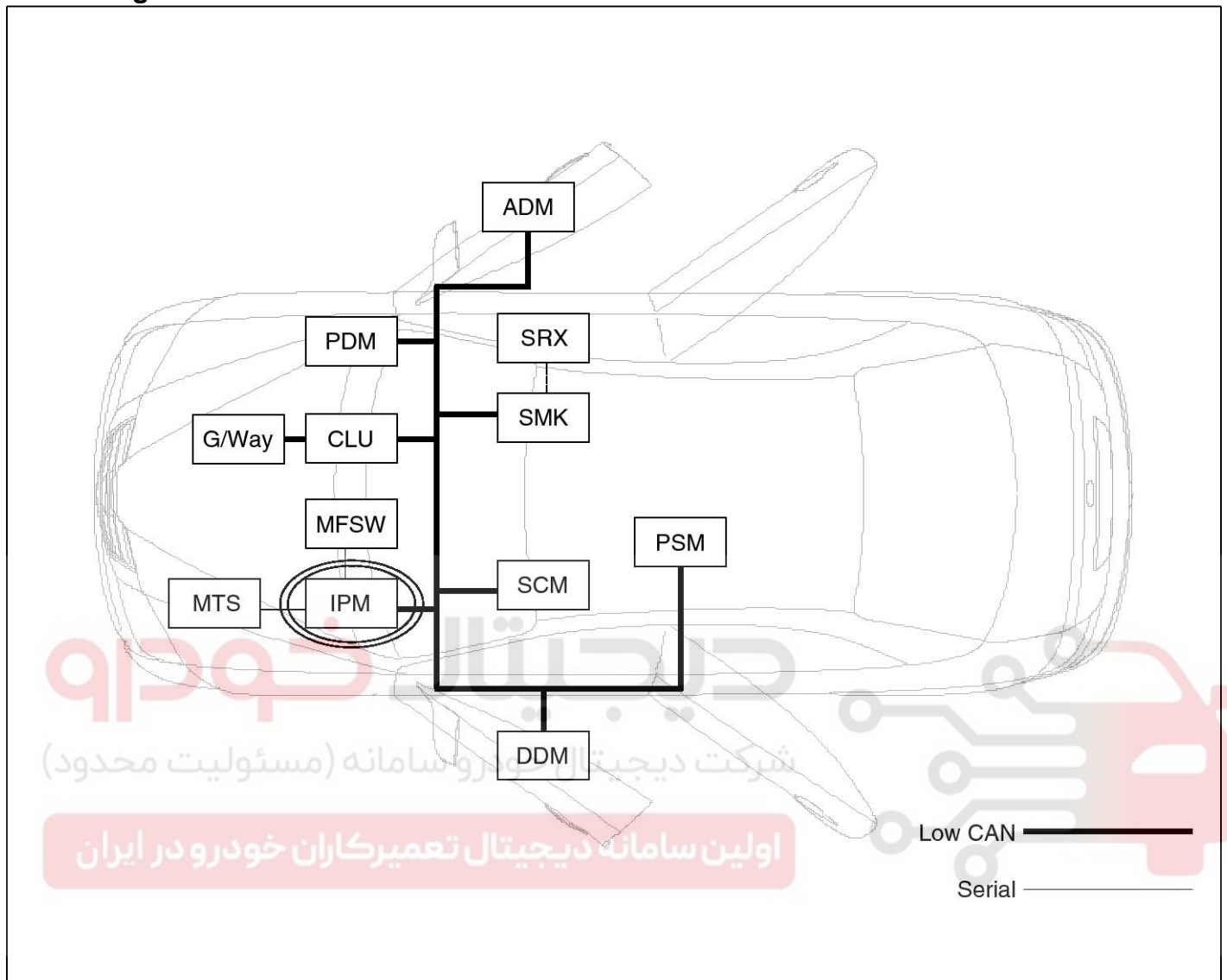
**BCM (Body Control Module)****BE-185****BCM(IPM) Output Signal SPEC**

| Pin NO. | Description                                      | Input characteristics | Input voltage |
|---------|--------------------------------------------------|-----------------------|---------------|
| G3      | Security indicator (LED)                         | Output (Logical)      | LED           |
| G5      | Head lamp washer                                 | Output                | Relay         |
| G12     | AV Tail                                          | Output                | -             |
| G14     | Key solenoid                                     | Output                | solenoid      |
| G15     | Key hole illumination                            | Output                | Lamp          |
| G20     | Auto light power                                 | Output                | -             |
| G24     | Burglar alarm horn relay                         | Output                | Relay         |
| G25     | Mood lamp                                        | Output (PWM)          | Lamp          |
| G26     | Assistant seat belt indicator                    | Output (Logical)      | LED           |
| H21     | Head lamp low beam signal                        | Output (PWM)          | Lamp          |
| K3      | Rear right power window down                     | Output                | Relay         |
| K4      | Rear left power window down                      | Output                | Relay         |
| K14     | Rear power window power                          | Output                | Relay         |
| K16     | Rear right power window up                       | Output                | Relay         |
| K17     | Rear left power window up                        | Output                | Relay         |
| K23     | Rain sensor output                               | Output (PWM)          | -             |
| K25     | Room lamp                                        | Output (PWM)          | Lamp          |
| L1      | Front turn right signal<br>(Front / Rear / Side) | Output                | Lamp          |
| L2      | Wiper speed low                                  | Output                | Relay         |
| L10     | Front turn left signal (Front / Rear / Side)     | Output                | Lamp          |
| L11     | Wiper speed high                                 | Output                | Relay         |
| L18     | External buzzer                                  | Output                | Buzzer        |

# BE-186

# Body Electrical System

## Block Diagram



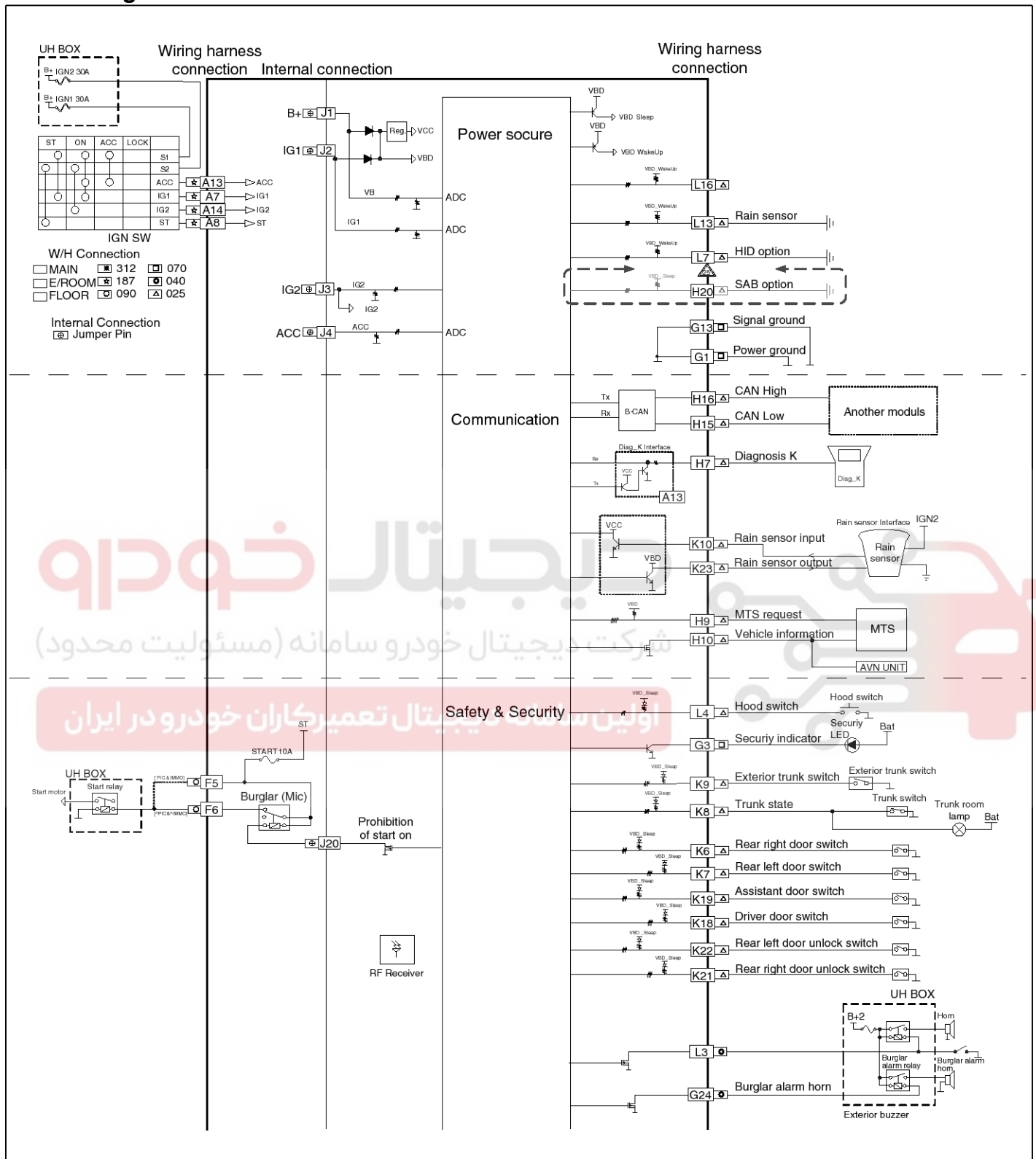
SVGBE0102L



# BCM (Body Control Module)

# BE-187

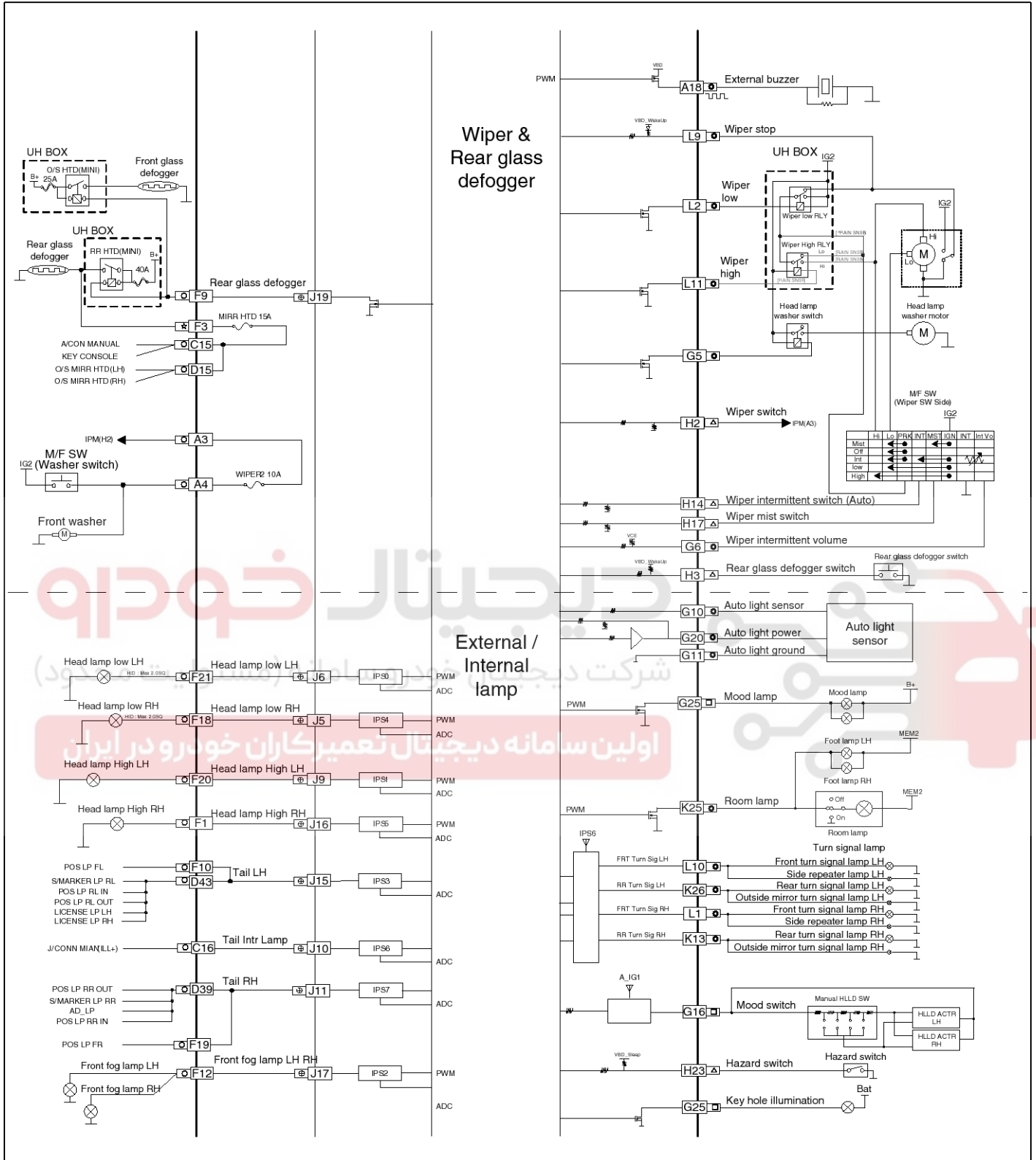
## Circuit Diagram



SVGBE0103L

# BE-188

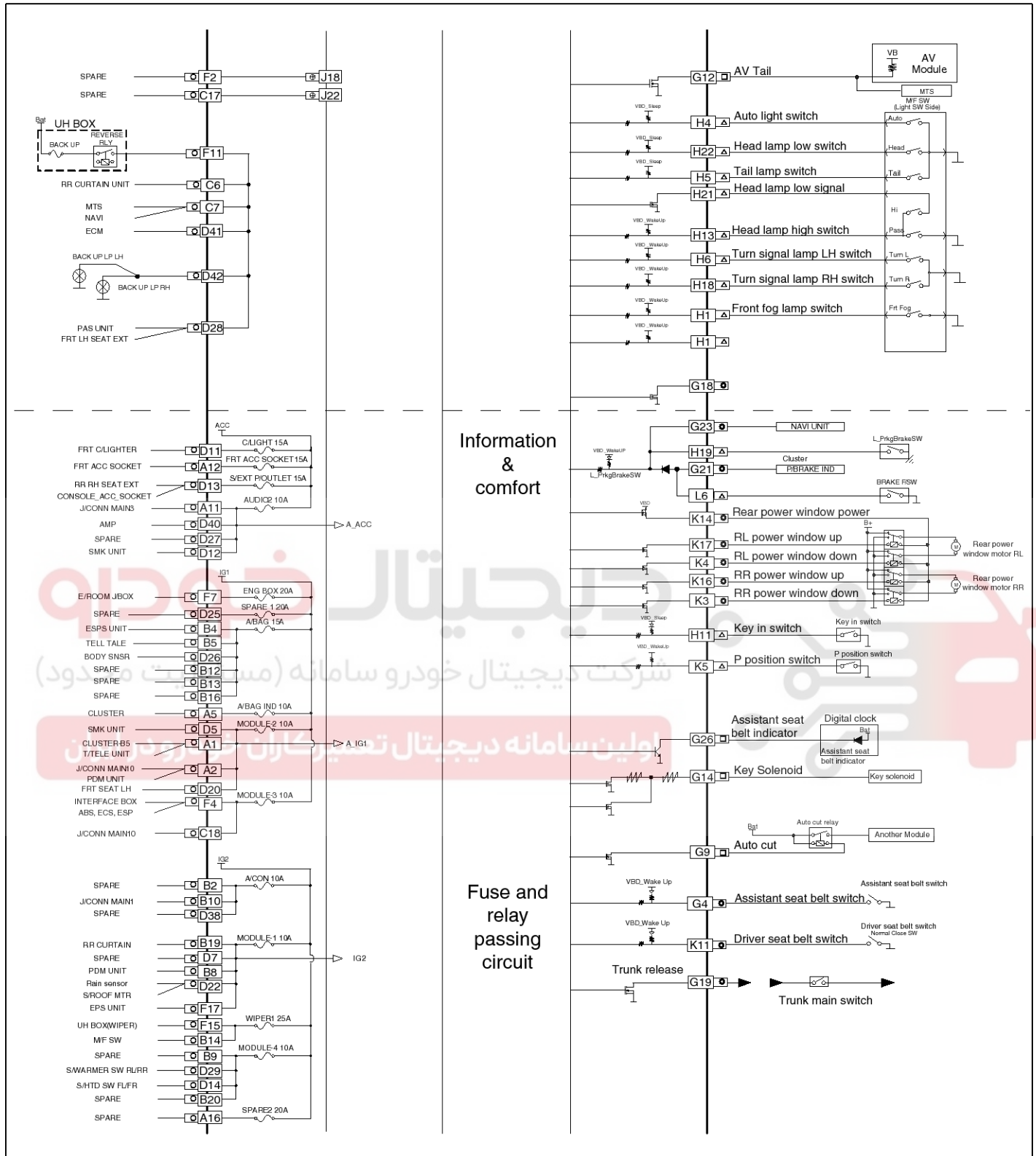
# Body Electrical System



SVGBE0104L

# BCM (Body Control Module)

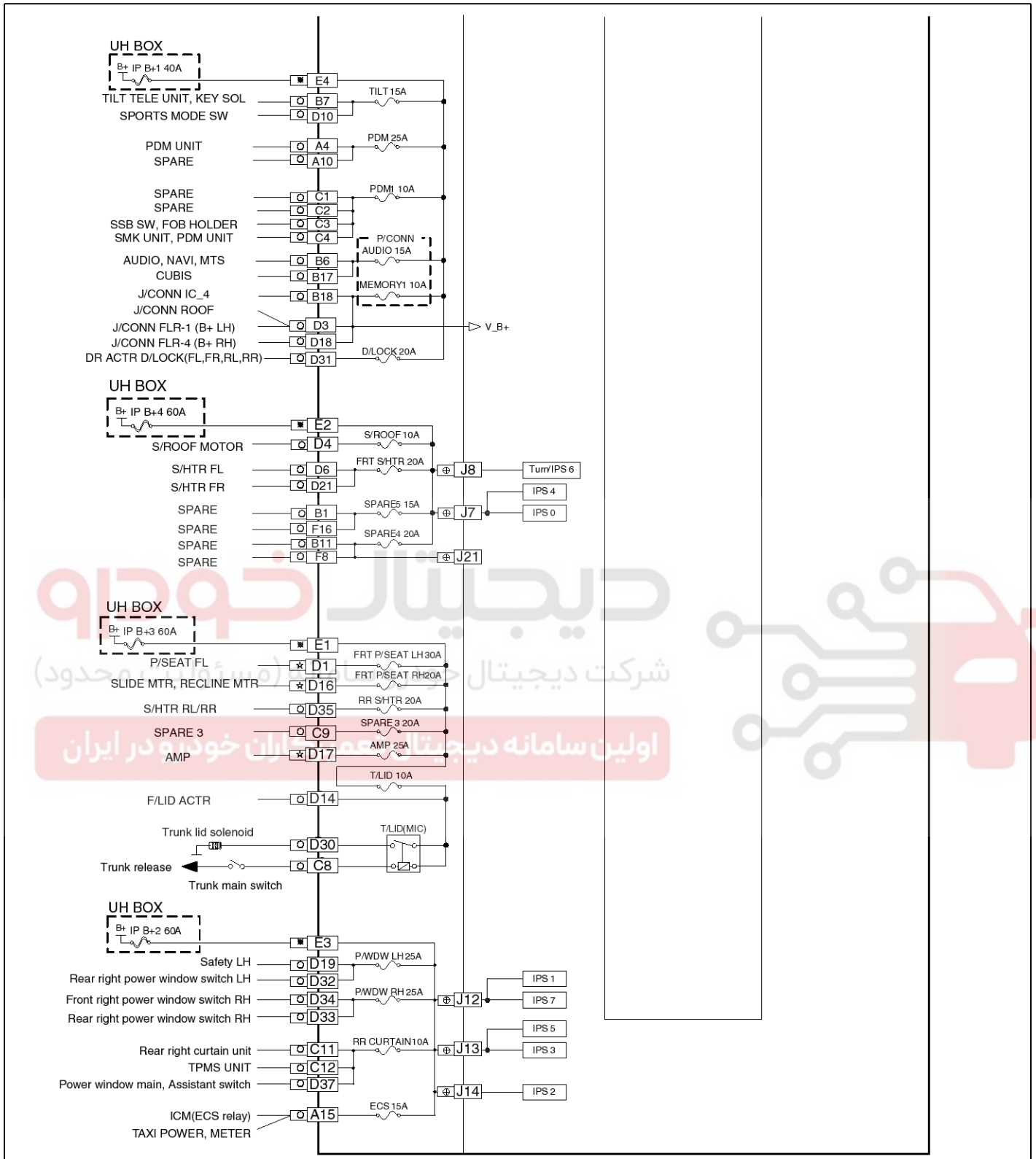
# BE-189



SVGBE0105L

# BE-190

# Body Electrical System



SVGBE0106L

# BCM (Body Control Module)

## BE-191

### IPM Overview

The Body Control Module (IPM-Intelligent integrated Platform Module) supplies vehicle occupants with visual and audible information and controls various vehicle functions.

To provide and receive information, the module is interfaced to the vehicle's CAN bus communications network.

### The IPM provides the following features :

- Door Lock Control(Send Lock/ Unlock commend via CAN)
- Burglar Alarm Control
- Decayed Room Lamp and MODE Lamp Control
- Key Hole Illumination Control
- Trunk Open Control

- Warning(Buzzer and indicator)Control
- Wiper control
- Lamp control (Tail, Head Lamp Low and High, Front fog, Room Lamp, Rear Fog lamp Control, HLLD)
- Turn/Hazard Signal Control
- Defroster
- External Buzzer and Burglar Alarm Horn control
- Panic
- MTS
- Window control
- Key interlock solenoid
- Input signal sends via CAN for local functions
- Diagnostic

### Abbreviations

| Abbreviations | Description                            |
|---------------|----------------------------------------|
| IPM           | Intelligent integrated Platform Module |
| SMK           | Smart Key                              |
| DDM           | Driver Door Module                     |
| ADM           | Assistant Door Module                  |
| RKE           | Remote Keyless Entry                   |
| CLU           | CLUster                                |
| MFSW          | Multi Function SWitch                  |
| IPS           | Intelligent Power Switch               |
| PSM           | Power Seat Module                      |
| SCM           | Steering Column Module                 |
| CAN           | Controller Area Network                |
| PDM           | Power Distribution Module              |
| SRX           | Standard Analog Receiver               |

# BE-192

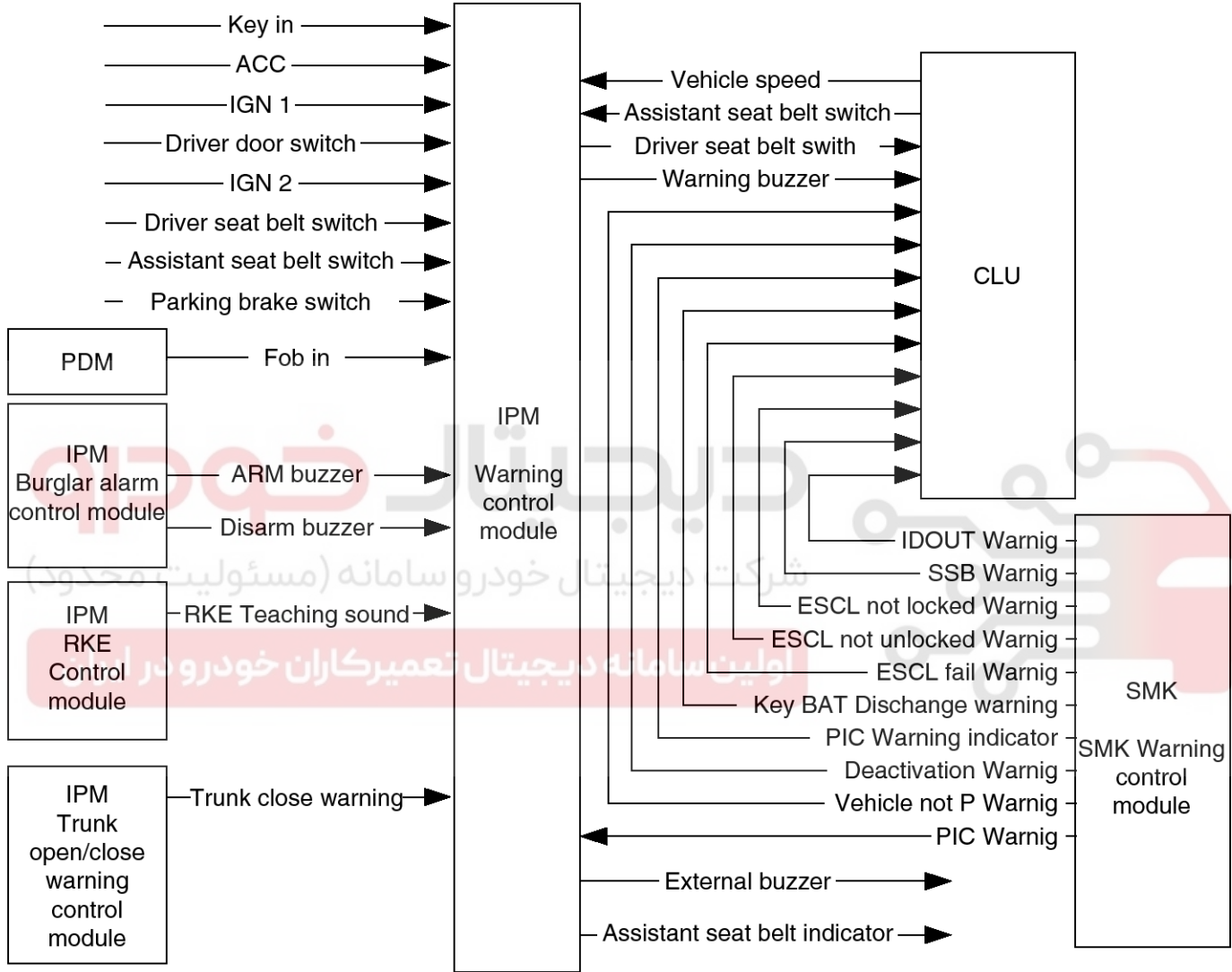
# Body Electrical System

## Function

### Warning Control

The Warning function offers the following features :

- Seat Belt Warning / Set Belt Reminder
- Over Speed Warning (Only for cluster)
- Key Reminder(Operated) Warning
- Parking Brake Warning
- RKE Key Teaching sound
- SMK System Warning
- ARM/DISARM Buzzer Control
- Trunk Closing Warning



SVGBE0107L

# BCM (Body Control Module)

# BE-193

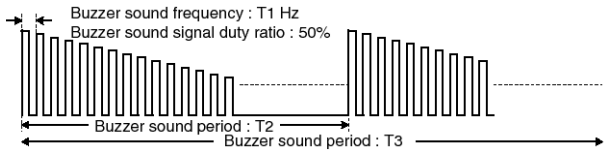
## Buzzer Operation

For Warning Sound Control Function, two types of Buzzers are used.

One is Internal Warning Buzzer located and controlled by Cluster.

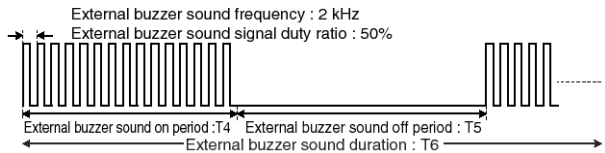
The other is External Buzzer controlled by IPM.

### 1. Internal Warning Buzzer Sound Characteristics



SVGBE0108L

### 2. External Buzzer Sound Characteristics



SVGBE0109L

## Priority of Warning Buzzer Condition

If there are multiple warning conditions simultaneously, the warning shall activate the warning based on the pre-defined priority: (1st is the highest priority)

### 1. Internal Buzzer

1<sup>st</sup> : Diagnostic sound (provided to test the Buzzer by way of Diagnostic tool)

2<sup>nd</sup> : Seat Belt warning / Seat Belt Reminder

3<sup>rd</sup> : Over Speed Warning (Cluster own this warning logic)

4<sup>th</sup> : Key Reminder(Operated) warning

5<sup>th</sup> : Parking Brake warning

6<sup>th</sup> : Warnings for SMK system (The Warning by CAN signal for SMK option only)

7<sup>th</sup> : RKE Key Teaching sound (non SMK option only)

If warnings appear simultaneously, it could not alarm same time. (Choose only one warning by priority)

| Priority | Name                                 | Logic Control | Buzzer Control |
|----------|--------------------------------------|---------------|----------------|
| 1        | Diagnostic sound                     | IPM           | CLU            |
| 2        | Seat Belt Warning                    |               |                |
| 3        | Overspeed Warning                    | CLU           |                |
| 4        | Key Reminder Warning                 | IPM           |                |
| 5        | Parking Brake Warning                |               |                |
| 6        | Steering Column Not Locked Warning   | SMK           |                |
| 7        | Deactivation Warning                 |               |                |
| 8        | ID Out Warning                       |               |                |
| 9        | Steering Column Not Unlocked Warning |               |                |
| 10       | ESCL ECU Fail Warning                |               |                |
| 11       | SSB Button Warning                   |               |                |
| 12       | Key Battery Discharging Warning      |               |                |
| 13       | Vehicle Not P Warning                |               |                |
| 14       | Key Teaching Sound (Non SMK Option)  | IPM           |                |



## BE-194

## Body Electrical System

## 2. External Buzzer

1<sup>st</sup> : SMK System Warning Sound2<sup>nd</sup> : ARM/DISARM Buzzer /Trunk close sound

| Priority | Name                                | Logic Control | Buzzer Control |
|----------|-------------------------------------|---------------|----------------|
| 1        | Diagnostic sound                    | SMK           | IPM            |
| 2        | ID Out Warning                      |               |                |
| 3        | Door Lock Warning 1 (SMK Option)    |               |                |
| 4        | Door Lock Warning 2 (SMK Option)    |               |                |
| 5        | Door Lock Warning 3 (SMK Option)    |               |                |
| 6        | Key Reminder Warning 2 (SMK Option) |               |                |
| 7        | SMK Trunk Warning (SMK Option)      |               |                |
| 8        | ARM Buzzer                          | IPM           |                |
| 9        | DISARM Buzzer                       |               |                |
| 10       | Trunk close sound                   |               |                |

# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



# BCM (Body Control Module)

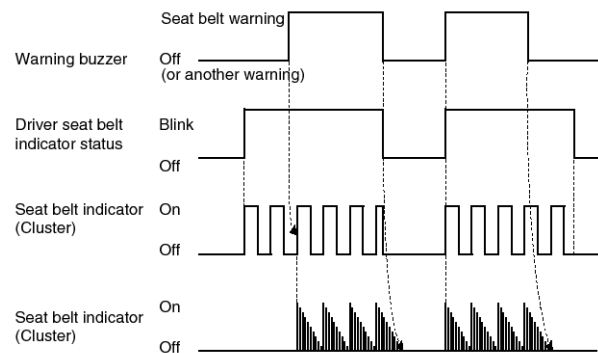
# BE-195

## Seat Belt Warning / Set Belt Reminder Function

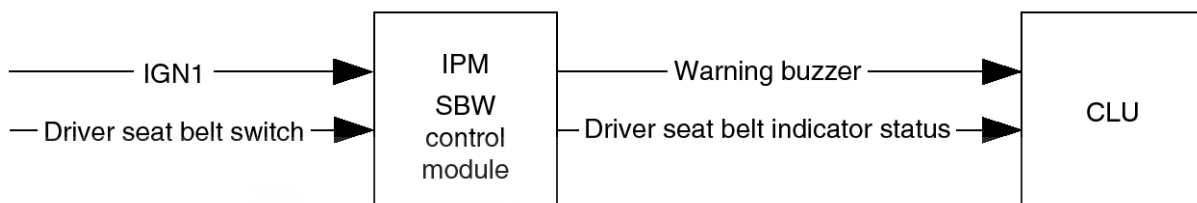
When driver or passengers have their seat belts unfasten during driving, sound or indicator warning remind them of fastening their seat belts. This function offers following features.

1. Turn on/off and blinking Driver side seatbelt indicator depending on Driver side seatbelt switch input.
2. Turn on/off and blinking Assistant side seatbelt indicator depending on Assistant side seatbelt switch input.
3. Turn on/off Internal Warning Buzzer depending on Driver side or Assistant side seatbelt switch input.

4. If vehicle speed exceeds a specific value, seatbelt indicator and Internal Warning Buzzer should be activated in accordance with defined pattern.



SVGBE0110L



SVGBE0111L

## State Description

1. "IGN1 OFF" to "IGN1 ON Driver Belted"

| State             | Description                                                                                                                                                      |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• Driver side Seatbelt is fastened</li> </ul>                                                                             |
| Event             | IGN1 On                                                                                                                                                          |
| Action            | <ul style="list-style-type: none"> <li>• State goes to "IGN1 ON Driver Belted".</li> <li>• DRV Seat Belt IND Status Off</li> <li>• Warning Buzzer Off</li> </ul> |

2. "IGN1 OFF" to "IGN1 ON Driver Unbelted"

| State             | Description                                                                                                                                                                                                      |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• Driver side Seatbelt is not fastened</li> </ul>                                                                                                                         |
| Event             | IGN1 On                                                                                                                                                                                                          |
| Action            | <ul style="list-style-type: none"> <li>• State goes to "IGN1 ON Driver Unbelted".</li> <li>• Driver Seatbelt Indicator blinks</li> <li>• Internal Warning Buzzer starts for a duration of Buzzer Time</li> </ul> |

3. "IGN1 ON Driver Unbelted" to "IGN1 OFF"

| State  | Description                                                                                                                                                                                                   |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Event  | IGN1 Off                                                                                                                                                                                                      |
| Action | <ul style="list-style-type: none"> <li>• State goes to "IGN1 OFF".</li> <li>• If Driver Seatbelt Indicator is blinking, it is stopped</li> <li>• If Internal Warning Buzzer is sounded, it is stop</li> </ul> |

# BE-196

# Body Electrical System

4. "IGN1 ON Driver Unbelted" to "IGN1 ON Driver Belted"

| State  | Description                                                                                                                                                                                                          |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Event  | Driver side Seatbelt is fastened                                                                                                                                                                                     |
| Action | <ul style="list-style-type: none"> <li>State goes to "IGN1 ON Driver Belted".</li> <li>If Driver Seatbelt Indicator is blinking, it is stopped</li> <li>If Internal Warning Buzzer is sounded, it is stop</li> </ul> |

5. "IGN1 ON Driver Unbelted" to "IGN1 ON Driver Unbelted"

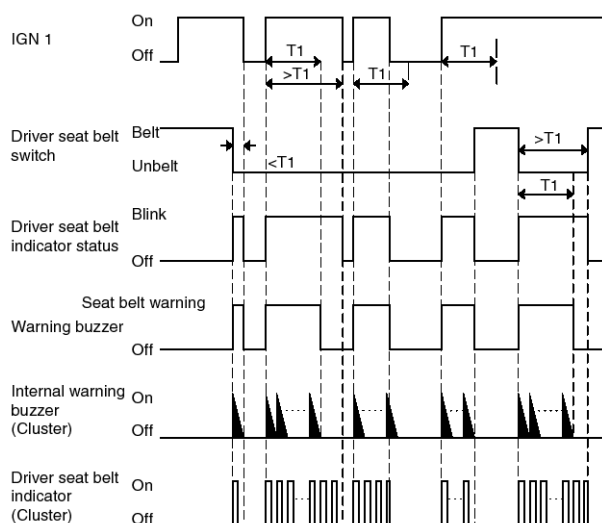
| State  | Description                                                                                                                                   |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Event  | If buzzer timer expired.                                                                                                                      |
| Action | <ul style="list-style-type: none"> <li>Internal Warning Buzzer is stopped</li> <li>Cancel Buzzer Timer</li> <li>No change of state</li> </ul> |

6. "IGN1 ON Driver Belted" to "IGN1 OFF"

| State  | Description                                                                 |
|--------|-----------------------------------------------------------------------------|
| Event  | IGN1 Off                                                                    |
| Action | <ul style="list-style-type: none"> <li>State goes to "IGN1 OFF".</li> </ul> |

7. "IGN1 ON Driver Belted" to "IGN1 ON Driver Unbelted"

| State  | Description                                                                                                                                                                                                 |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Event  | Driver side Seatbelt is not fastened                                                                                                                                                                        |
| Action | <ul style="list-style-type: none"> <li>State goes to "IGN1 ON Driver Unbelted".</li> <li>Driver Seatbelt Indicator blinks</li> <li>Internal Warning Buzzer starts for a duration of Buzzer Timer</li> </ul> |



SVGBE0124L

T1 : Buzzer time (6 ± 0.1 sec)

In case of 6sec warning duration, IPM shall internally control signal activate the warning for about 5.7sec

# BCM (Body Control Module)

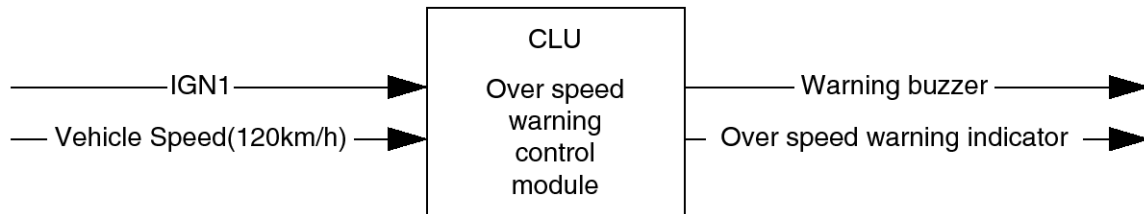
# BE-197

## Overspeed Warning (Cluster)

1. Overspeed Indicator Warning Control
2. Overspeed Buzzer Warning Control

Over speed warning function is not managed by IPM. It is managed by CLUSTER.

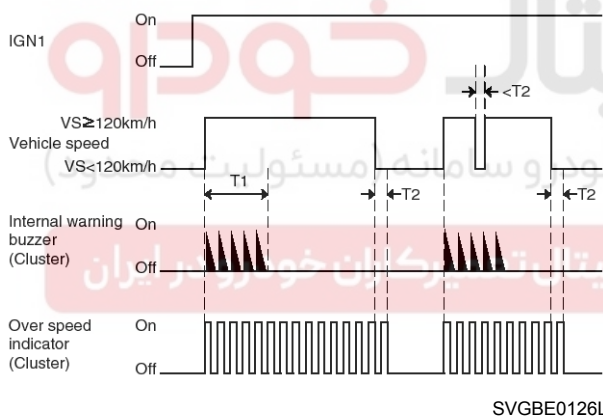
The below corresponding description for the function logic is only at destination of the CLUSTER.



SVGBE0125L

If the vehicle speed exceeds the specific value, Driver can recognize over speed through a buzzer and indicator warning.

This function logic is operated by Cluster.



SVGBE0126L

T1 : Over speed buzzer time ( $5 \pm 0.1$  sec),

T2 : Over speed stable time ( $1 \pm 0.1$  sec)

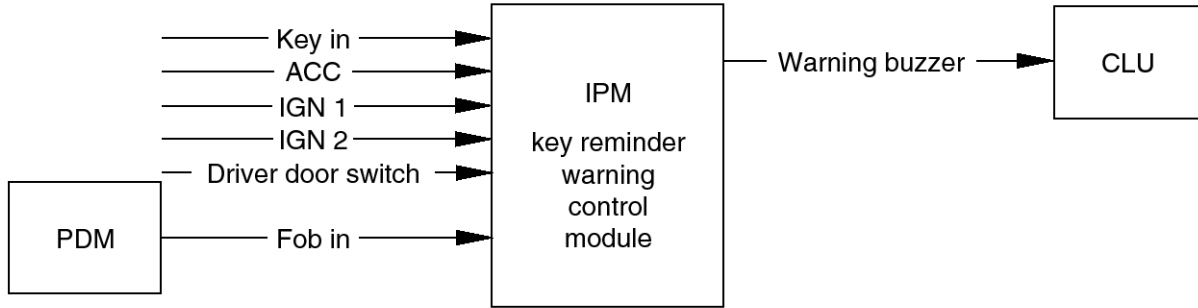


# BE-198

# Body Electrical System

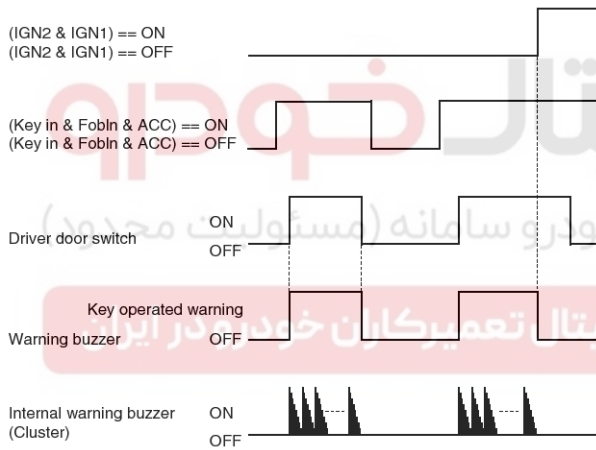
## Key Reminder Warning (Key Operated Warning) Function

Internal Warning Buzzer Control by Key Reminder Warning function



SVGBE0112L

If driver opens the driver side door and go away from the car during key is inserted or ACC state, a sound warning reminds a driver that key has to be taken off or ACC state has to be changed to Off state.



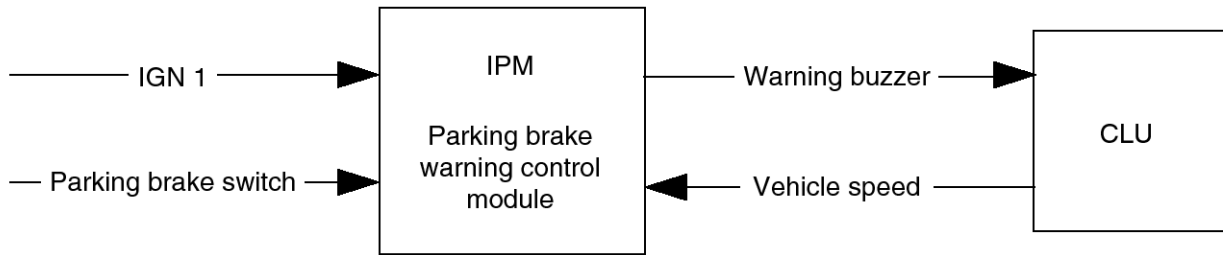
SVGBE0113L



# BCM (Body Control Module)

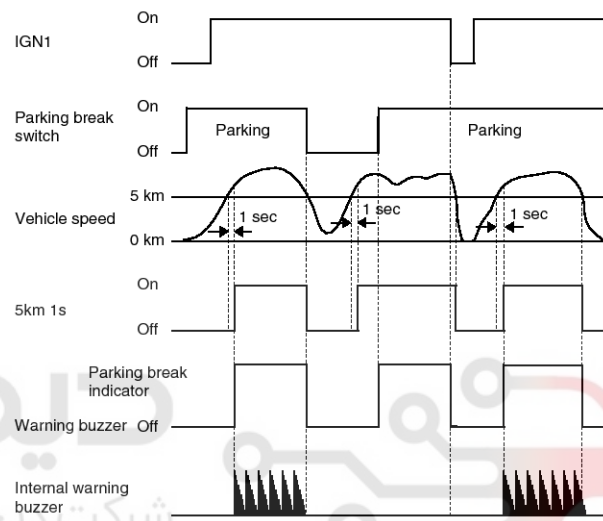
# BE-199

## Parking Brake Warning



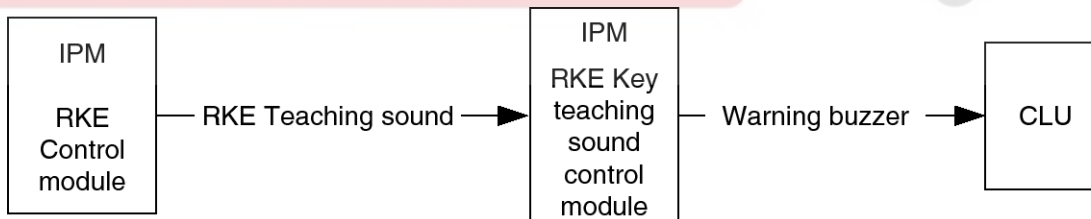
SVGBE0114L

If driver drives the vehicle with parking brake not or not completely released and vehicle speed exceeds the specific value of 5km/h, a sound warning reminds the driver that parking brake has to be released.



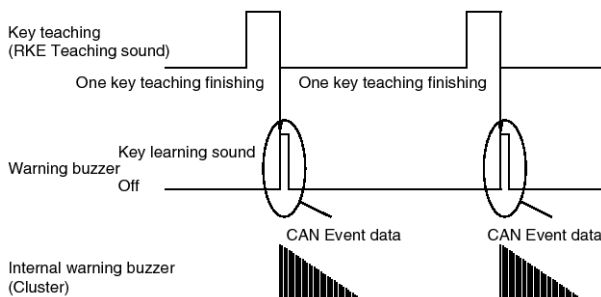
SVGBE0115L

## RKE Key Teaching Sound



SVGBE0116L

When each Key's teaching is ended, Warning buzzer is operated, one time.



SVGBE0117L

# BE-200

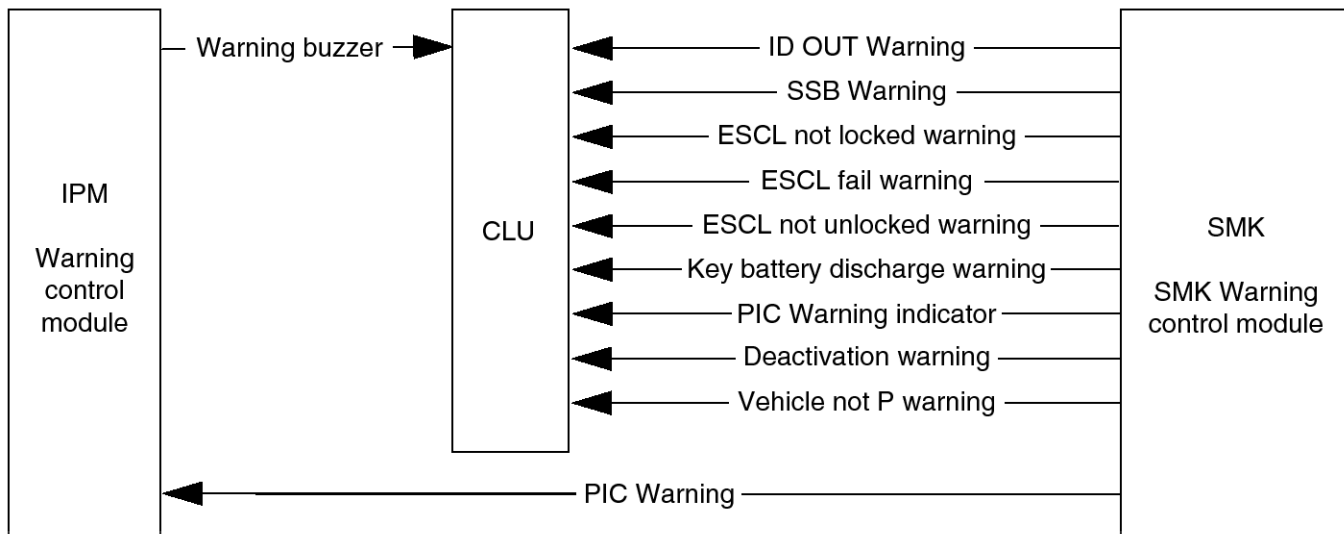
# Body Electrical System

## SMK System Warning Sound

1. External Buzzer control for SMK System warning

2. Internal Warning Buzzer control for SMK System warning

3. Warning Indicator control for SMK System warning



SVGBE0118L

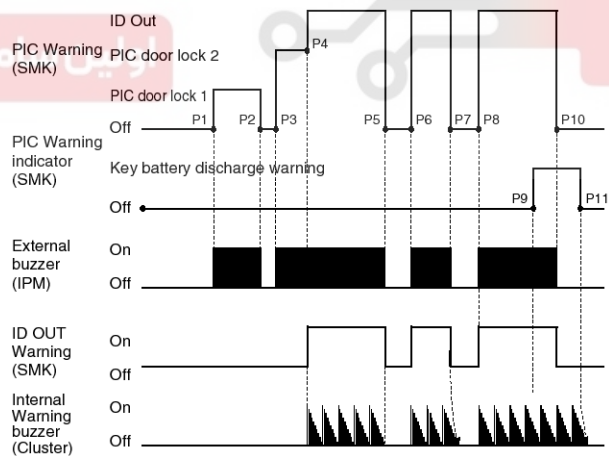
SMK System Warnings conditions of activation are controlled by the SMK unit. When a condition is satisfied, SMK unit sends corresponding warning request to IPM and cluster by CAN, IPM only operates the external buzzer. Internal Warning Buzzer or Warning Indicator are operated by the Cluster. (refer the SMK warning specification.)

4. P8/P9/P10/P11: During operating External Buzzer and Internal Warning Buzzer, if another warning CAN data is received, operate External Buzzer and Warning buzzer base on the priority but there is no interruption.

## Relation between Warning buzzer and External Buzzer for SMK System warning

Because Warning Sound durations are controlled by the SMK unit, IPM and Cluster have to operate the buzzer during CAN signal request duration.

- P1/P2/P3: External Buzzer is operated during SMK CAN data request.
- P4/P5: Internal Warning Buzzer operation independent External Buzzer operation, Cluster operate Internal Warning Buzzer during SMK CAN data request.
- P6/P7: During operating External Buzzer and Internal Warning Buzzer, if CAN signal change to "Off", IPM stop External Buzzer operation immediately but Cluster stop the Internal Warning Buzzer after one warning period.



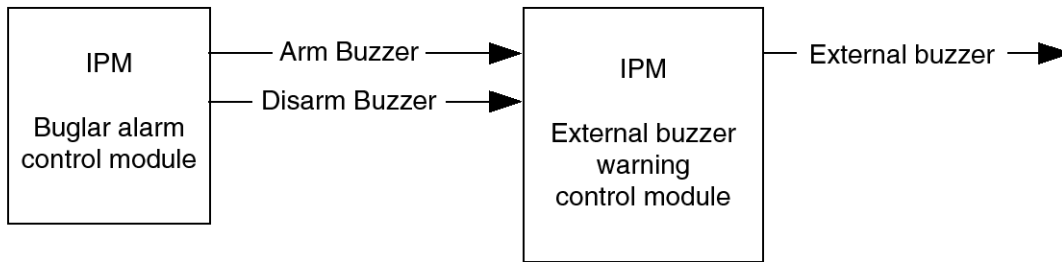
SVGBE0119L



# BCM (Body Control Module)

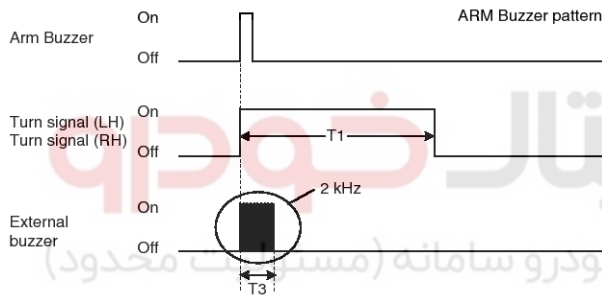
# BE-201

## ARM/DISARM Buzzer Sound



If there is a request for having the ARM buzzer (Arm Buzzer = Off → On) or DISARM buzzer (Disarm Buzzer = Off → On), a pattern of External Buzzer (External Buzzer) is performed. It is possible to enable/disable by diagnostic tool.

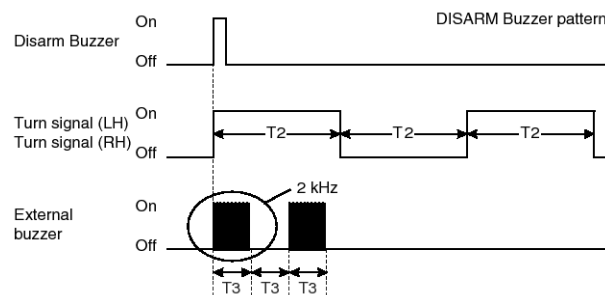
- Another ARM/ DISARM Buzzer is ignored during the Buzzer activated.



SVGBE0121L

T1 : ARM flash time ( $1 \pm 0.1$  sec),  
 T3 : ARM DISARM buzzer time ( $0.1 \pm 0.1$  sec)

SVGBE0120L



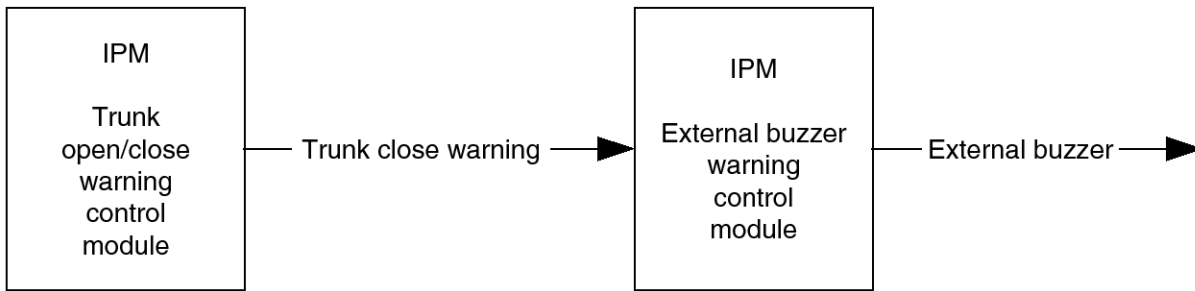
SVGBE0122L

T1 : DIAARM flash time ( $500 \pm 50$  sec),  
 T3 : ARM DISARM buzzer time ( $0.1 \pm 0.1$  sec)

# BE-202

# Body Electrical System

## Trunk Closing Warning Sound



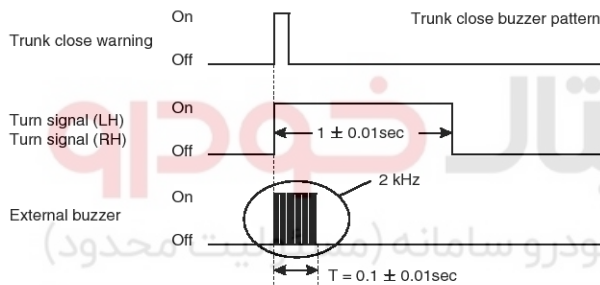
SVGBE0123L

If there is a request for having the Trunk Closing Warning, a pattern of External Buzzer is performed.

It is possible to enable/disable by diagnostic tool.

Trunk close warning with Buzzer sound.

This warning is related to turn signal. Refer to TurnHazard System Function Specification.



دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

SVGBE0127L

# BCM (Body Control Module)

## BE-203

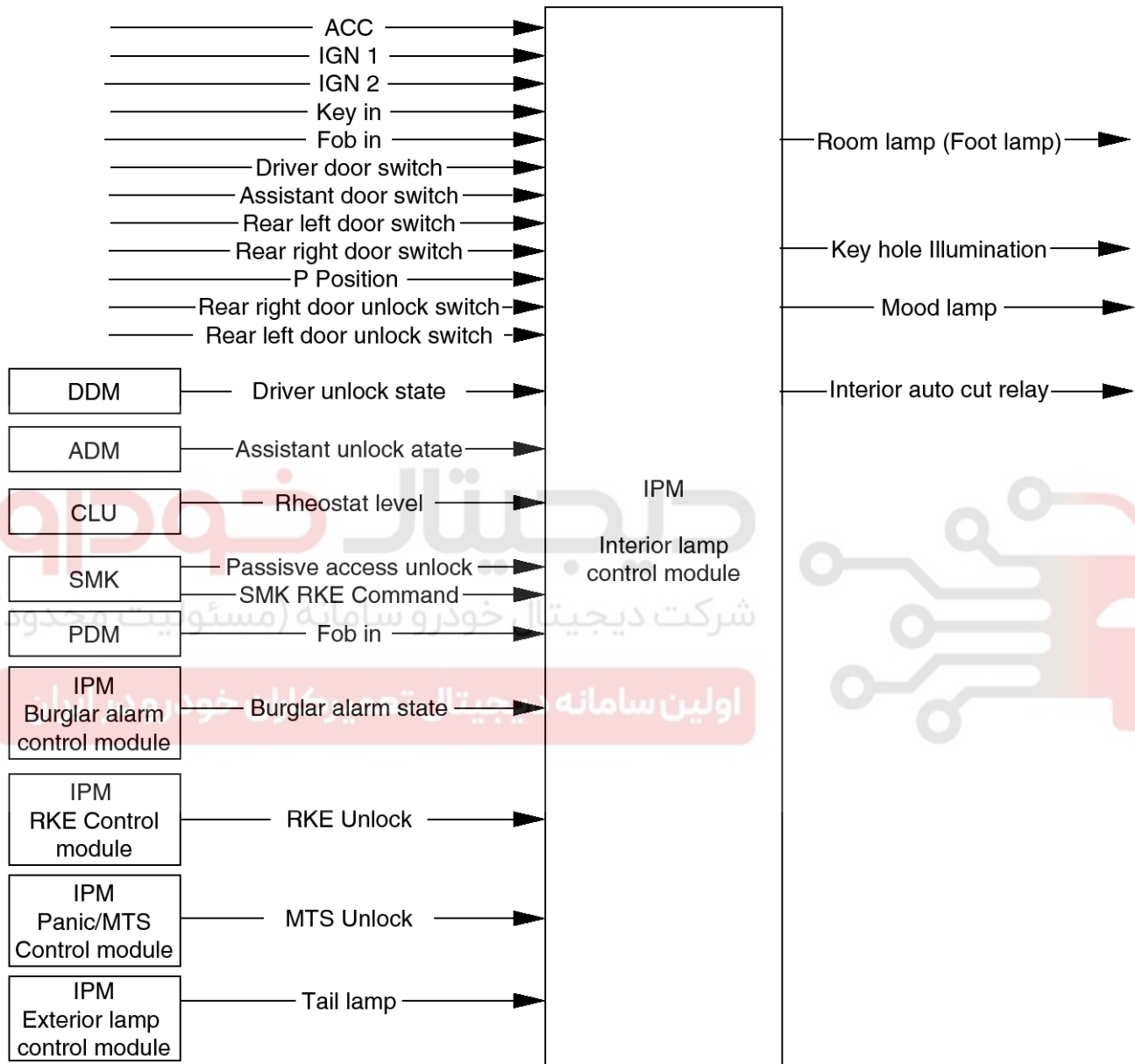
### Interior Light Control

The Interior Light System Offers The Following Features

- Room Lamp Control
- Foot Lamp Control

- Key Hole Illumination
- Mood Lamp Control

[Interior Lamp Autocut]



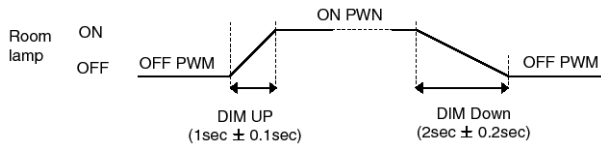
SVGBE0128L

# BE-204

# Body Electrical System

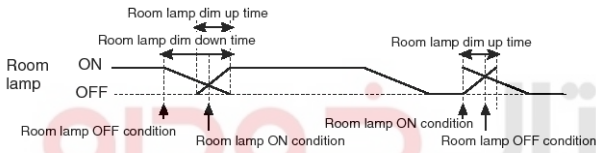
## Room Lamp Control Function

### 1. Room Lamp Dimming



SVGBE0129L

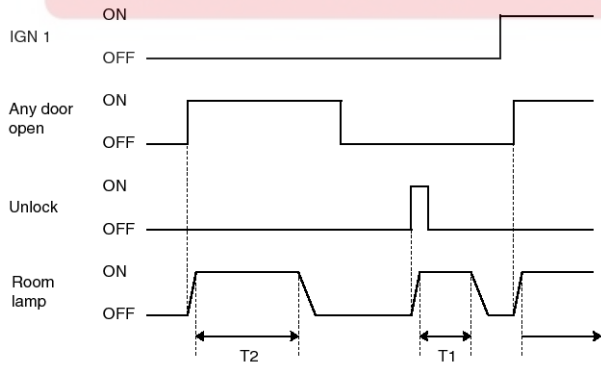
- 1) Room Lamp Bright is controlled by PWM (ON PWM is 100% , OFF PWM is 0%)
- 2) Room Lamp Output  
 Off: PWM 0%  
 On: PWM 100%  
 Dim Up: PWM increasing  
 Dim Down: PWM decreasing
- 3) If Room Lamp off condition appears during Dimming up, it directly start dimming down.



SVGBE0130L

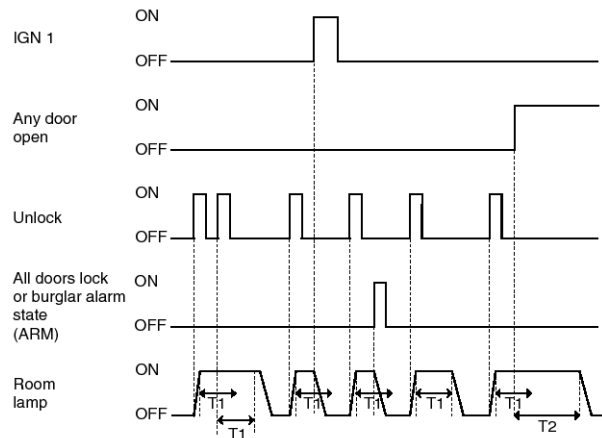
- 4) Room Lamp REQ Status' used for mood lamp logic, this signal "On" when room lamp turn on (start to dim up).

### 2. Room lamp timing chart



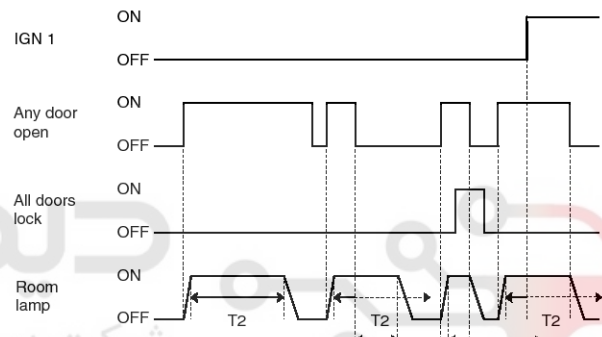
SVGBE0131L

T1 : Room lamp 30 Time, T2 : Room lamp 20 Time



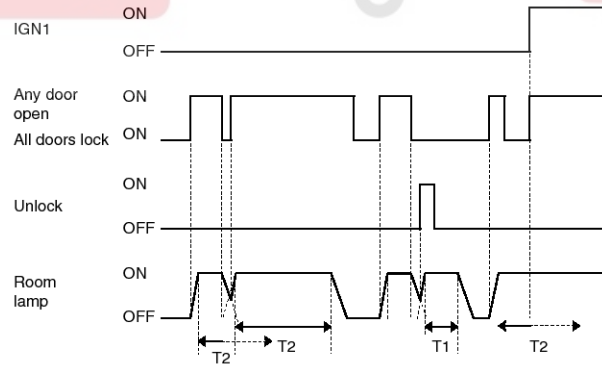
SVGBE0132L

T1 : Room lamp 30 Time, T2 : Room lamp 20 Time



SVGBE0133L

T1 : Room lamp 30 Time, T2 : Room lamp 20 Time



SVGBE0134L

T1 : Room lamp 30 Time, T2 : Room lamp 20 Time

# BCM (Body Control Module)

**BE-205****State Description**

## 1. Room Lamp Off

**Condition 1**

| State             | Description                                                                                                            |
|-------------------|------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp Off" state :<br>All Doors Close On                                                                          |
| Event             | 1. Key Off & (Unlock Off → On)<br>2. Key On → Off                                                                      |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Room Lamp Dim Up"</li> <li>Room Lamp 30s On REQ On</li> </ul> |

**Condition 2**

| State             | Description                                                                                                            |
|-------------------|------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp Off" state :<br>IGN1 Off                                                                                    |
| Event             | 1. Any Door Open Off → On or<br>2. Reset & Any Door Open On                                                            |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Room Lamp Dim Up"</li> <li>Room Lamp 20m On REQ On</li> </ul> |

**Condition 3**

| State             | Description                                                                                                        |
|-------------------|--------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp Off" state :                                                                                            |
| Event             | IGN1 On & Any Door Open On                                                                                         |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Room Lamp Dim Up"</li> <li>Room Lamp On REQ On</li> </ul> |

## 2. Room Lamp Dim Up

**Condition 1**

| State             | Description                                                                                                                                                                                                           |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp Dim Up" state :<br>All Doors Close On                                                                                                                                                                      |
| Event             | 1. Key Off & ( Unlock Off → On)<br>2. Key On → Off                                                                                                                                                                    |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Room Lamp Dim Down"</li> <li>Room Lamp 30s On REQ Off</li> <li>Room Lamp 20m On REQ Off</li> <li>Room Lamp On REQ Off</li> <li>Room Lamp Dim Down</li> </ul> |

**BE-206****Body Electrical System****Condition 2**

| State             | Description                                                                                                                                                                                                           |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp Dim Up" state :<br>All Doors Close On                                                                                                                                                                      |
| Event             | 1. All Doors Lock Off → On or<br>2. BA State ARM or<br>3. IGN1 On                                                                                                                                                     |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Room Lamp Dim Down"</li> <li>Room Lamp 30s On REQ Off</li> <li>Room Lamp 20m On REQ Off</li> <li>Room Lamp On REQ Off</li> <li>Room Lamp Dim Down</li> </ul> |

**Condition 3**

| State             | Description                                                                                                                                                                                                           |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp Dim Up" state :<br>b_AllDoorsLock == On                                                                                                                                                                    |
| Event             | b_AllDoorsClose == Off → On                                                                                                                                                                                           |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Room Lamp Dim Down"</li> <li>Room Lamp 30s On REQ Off</li> <li>Room Lamp 20m On REQ Off</li> <li>Room Lamp On REQ Off</li> <li>Room Lamp Dim Down</li> </ul> |

**Condition 4**

| State             | Description                                                                                                                                                                                                  |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp Dim Up" state :<br>Room Lamp 30s On REQ On                                                                                                                                                        |
| Event             | Room Lamp Bright ON PWM                                                                                                                                                                                      |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Room Lamp 30sec On"</li> <li>Start Room Lamp 30 Timer</li> <li>Room Lamp On (during Room Lamp 30 Time)</li> <li>Room Lamp 30s On REQ Off</li> </ul> |

**Condition 5**

| State             | Description                                                                                                                                                                                                  |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp Dim Up" state :<br>Room Lamp 20m On REQ On                                                                                                                                                        |
| Event             | Room Lamp Bright ON PWM                                                                                                                                                                                      |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Room Lamp 20min On"</li> <li>Start Room Lamp 20 Timer</li> <li>Room Lamp On (during Room Lamp 20 Time)</li> <li>Room Lamp 20m On REQ Off</li> </ul> |

**BCM (Body Control Module)****BE-207****Condition 6**

| State             | Description                                                                                                                           |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp Dim Up" state :<br>Room Lamp On REQ On                                                                                     |
| Event             | Room Lamp Bright ON PWM                                                                                                               |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Room Lamp On"</li> <li>Room Lamp On</li> <li>Room Lamp On REQ Off</li> </ul> |

**Condition 7**

| State             | Description                                                                                                                               |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp Dim Up" state :<br>All Doors Close On                                                                                          |
| Event             | <ol style="list-style-type: none"> <li>Key Off &amp; (Unlock Off → On)</li> <li>Key On → Off</li> </ol>                                   |
| Action            | <ul style="list-style-type: none"> <li>Room Lamp 30s On REQ On</li> <li>Room Lamp On REQ Off</li> <li>Room Lamp 20m On REQ Off</li> </ul> |

**Condition 8**

| State             | Description                                                                                                                               |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp Dim Up" state :<br>IGN1 Off & All Doors Lock Off                                                                               |
| Event             | All Doors Close Off → On                                                                                                                  |
| Action            | <ul style="list-style-type: none"> <li>Room Lamp 30s On REQ On</li> <li>Room Lamp On REQ Off</li> <li>Room Lamp 20m On REQ Off</li> </ul> |

**Condition 9**

| State             | Description                                                                                                                               |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp Dim Up" state :                                                                                                                |
| Event             | IGN1 On & Any Door Open On                                                                                                                |
| Action            | <ul style="list-style-type: none"> <li>Room Lamp On REQ On</li> <li>Room Lamp 30s On REQ Off</li> <li>Room Lamp 20m On REQ Off</li> </ul> |

**Condition 10**

| State             | Description                                                                                                                               |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp Dim Up" state :<br>Any Door Open On                                                                                            |
| Event             | IGN1 Off → On                                                                                                                             |
| Action            | <ul style="list-style-type: none"> <li>Room Lamp 20m On REQ On</li> <li>Room Lamp On REQ Off</li> <li>Room Lamp 30s On REQ Off</li> </ul> |



**BE-208****Body Electrical System****Condition 11**

| State             | Description                                                                                                                               |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp Dim Up" state :<br>IGN1 Off                                                                                                    |
| Event             | Any Door Open Off → On                                                                                                                    |
| Action            | <ul style="list-style-type: none"> <li>Room Lamp 20m On REQ On</li> <li>Room Lamp On REQ Off</li> <li>Room Lamp 30s On REQ Off</li> </ul> |

3. Room Lamp 30sec On

**Condition 1**

| State             | Description                                                                                                                                                                                            |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp 30sec On" state :                                                                                                                                                                           |
| Event             | <ol style="list-style-type: none"> <li>IGN1 On or</li> <li>Room Lamp 30 Timer <math>\geq</math> 30sec or</li> <li>All Doors Lock Off → On or</li> <li>Burglar State ARM</li> </ol>                     |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Room Lamp Dim Down"</li> <li>Cancel Room Lamp 30 Timer</li> <li>Room Lamp Dim Down (Maximum Dimming time: Room Lamp Dim Down Time)</li> </ul> |

**Condition 2**

| State             | Description                                                                                                                                                           |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp 30sec On" state :<br>All Doors Close On                                                                                                                    |
| Event             | <ol style="list-style-type: none"> <li>Key Off &amp; (Unlock Off → On)</li> <li>Key On → Off</li> </ol>                                                               |
| Action            | <ul style="list-style-type: none"> <li>State remains "Room Lamp 30sec On"</li> <li>Re-start Room Lamp 30 Timer (re-start for additional Room Lamp 30 Time)</li> </ul> |

**Condition 3**

| State             | Description                                                                                                                                                                                                   |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp 30sec On" state :<br>IGN1 Off                                                                                                                                                                      |
| Event             | Any Door Open Off → On                                                                                                                                                                                        |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Room Lamp 20min On"</li> <li>Cancel Room Lamp 30 Timer</li> <li>Start Room Lamp 20 Timer</li> <li>Room Lamp On (during Room Lamp 20 Time)</li> </ul> |

# BCM (Body Control Module)

## BE-209

### 4. Room Lamp 20min On

#### Condition 1

| State             | Description                                                                                                                                                                                            |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp 20min On" state :                                                                                                                                                                           |
| Event             | <ul style="list-style-type: none"> <li>Room Lamp20 Timer <math>\geq</math> 20min or</li> <li>IGN1 Off &amp; All Doors Close On &amp; All Doors Lock On</li> </ul>                                      |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Room Lamp Dim Down"</li> <li>Cancel Room Lamp 20 Timer</li> <li>Room Lamp Dim Down (Maximum Dimming time: Room Lamp Dim Down Time)</li> </ul> |

#### Condition 2

| State             | Description                                                                                                                                                                                                   |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp 20min On" state :<br>IGN1 Off                                                                                                                                                                      |
| Event             | All Doors Close On & All Doors Lock Off                                                                                                                                                                       |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Room Lamp 30sec On"</li> <li>Cancel Room Lamp 20 Timer</li> <li>Start Room Lamp 30 Timer</li> <li>Room Lamp On (during Room Lamp 30 Time)</li> </ul> |

#### Condition 3

| State             | Description                                                                                                                                |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp 20min On" state :                                                                                                               |
| Event             | IGN1 On                                                                                                                                    |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Room Lamp On"</li> <li>Cancel Room Lamp 20 Timer</li> <li>Room Lamp On</li> </ul> |

### 5. Room Lamp Dim Down

#### Condition 1

| State             | Description                                                                                               |
|-------------------|-----------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp Dim Down" state :                                                                              |
| Event             | Room Lamp Bright OFF PWM                                                                                  |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Room Lamp Off"</li> <li>Room Lamp Off</li> </ul> |

#### Condition 2

| State             | Description                                                                                                     |
|-------------------|-----------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp Dim Down" state :                                                                                    |
| Event             | Room Lamp On REQ On or<br>Room Lamp 20m On REQ On or<br>Room Lamp 30s On REQ On                                 |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Room Lamp Dim Up"</li> <li>Room Lamp Dim Up</li> </ul> |

**BE-210****Body Electrical System****Condition 3**

| State             | Description                                        |
|-------------------|----------------------------------------------------|
| Initial Condition | "Room Lamp Dim Down" state :<br>All Doors Close On |
| Event             | 1. Key Off & (Unlock Off → On)<br>2. Key On → Off  |
| Action            | • Room Lamp 30s On REQ On                          |

**Condition 4**

| State             | Description                   |
|-------------------|-------------------------------|
| Initial Condition | IGN1 Off & All Doors Lock Off |
| Event             | All Doors Close Off → On      |
| Action            | • Room Lamp 30s On REQ On     |

**Condition 5**

| State             | Description                  |
|-------------------|------------------------------|
| Initial Condition | "Room Lamp Dim Down" state : |
| Action            | • Room Lamp On REQ On        |

**Condition 6**

| State             | Description                                      |
|-------------------|--------------------------------------------------|
| Initial Condition | "Room Lamp Dim Down" state :<br>Any Door Open On |
| Action            | • Room Lamp 20m On REQ On                        |

**Condition 7**

| State             | Description                              |
|-------------------|------------------------------------------|
| Initial Condition | "Room Lamp Dim Down" state :<br>IGN1 Off |
| Event             | Any Door Open Off → On                   |

# BCM (Body Control Module)

# BE-211

## 6. Room Lamp On

### Condition 1

| State             | Description                                                                                                                                                          |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp On" state :<br>IGN1 On                                                                                                                                    |
| Event             | All Doors Close On                                                                                                                                                   |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Room Lamp Dim Down"</li> <li>Room Lamp Dim Down (Maximum Dim Down time: Room Lamp Dim Down Time)</li> </ul> |

### Condition 2

| State             | Description                                                                                                                                                                |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp On" state :                                                                                                                                                     |
| Event             | IGN1 Off & All Doors Close On                                                                                                                                              |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Room Lamp 30sec On"</li> <li>Start Room Lamp 30 Timer</li> <li>Room Lamp On (during Room Lamp 30 Time)</li> </ul> |

### Condition 3

| State             | Description                                                                                                                                                                |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Room Lamp On" state :                                                                                                                                                     |
| Event             | IGN1 Off & Any Door Open On                                                                                                                                                |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Room Lamp 20min On"</li> <li>Start Room Lamp 20 Timer</li> <li>Room Lamp On (during Room Lamp 20 Time)</li> </ul> |

### Foot Lamp Control Function

Foot lamp On / Off / Dim Up / Dim Down control

| No | Pre-condition                | Event                               | Result                                                           |
|----|------------------------------|-------------------------------------|------------------------------------------------------------------|
| 1  | All Door Close, Key Off      | Any Door Unlock                     | Start Dimming Up (during 1s)<br>next Foot Lamp On (during 30s)   |
| 2  |                              | Key Off<br>→ KeyIn or Fob In or IGN |                                                                  |
| 3  | IGN1 Off                     | Any Door Open                       | Start Dimming Up (during 1s)<br>next Foot Lamp On (during 20min) |
| 4  | IGN1 On                      |                                     | Start Dimming Up (during 1s)<br>next Foot Lamp On                |
| 5  | All Door Close, Foot Lamp On | All Door Close                      | Foot Lamp Dimming Down<br>(during 2s)                            |
| 6  |                              | All Door Lock                       |                                                                  |
| 7  |                              | ARM mode                            |                                                                  |
| 8  |                              | IGN1 Off→On                         |                                                                  |

# BE-212

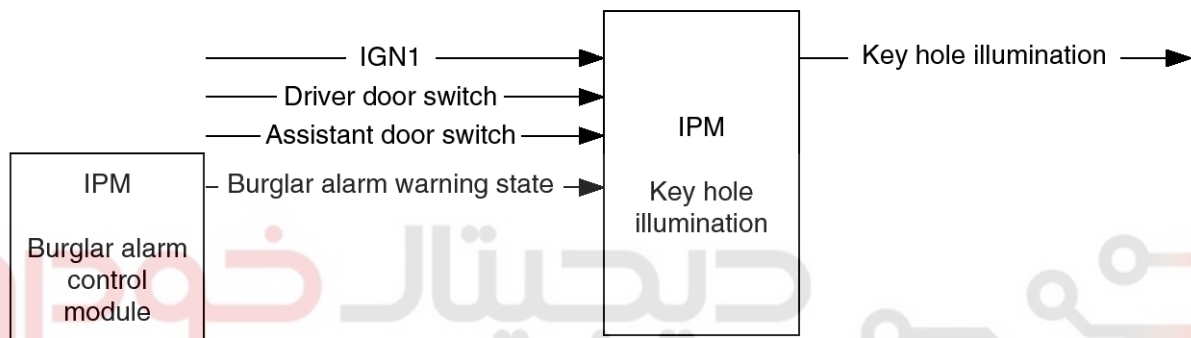
# Body Electrical System

## Key Hole Illumination Lamp Function

- Key hole illumination lamp On/Off control

| No | Pre-condition                                            | Event                             | Result                            |
|----|----------------------------------------------------------|-----------------------------------|-----------------------------------|
| 1  | IGN1 Off                                                 | Drive Door Open                   | Key Hole Illumination On          |
| 2  |                                                          | Assistant Door Open               |                                   |
| 3  | Key Hole Illumi On                                       | IGN1 Off→On                       | Key Hole Illumination Off         |
| 4  | Key Hole Illumi On,<br>Drive Door & Assistant Door Close | ARM mode                          |                                   |
| 5  | Key Hole Illumi On                                       | Drive Door & Assistant Door Close | Key Hole Illumination On (30 sec) |

## [Key Hole Illumination Lamp System Diagrams



شرکت دیجیتالی خودروسامانه (مسئولیت محدود)

SVGBE0135L

### 1. Key Hole Illumination Off

#### Condition 1

| State             | Description                                                                                                                  |
|-------------------|------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Key Hole Illumination Off" state :<br>IGN1 Off                                                                              |
| Event             | <ul style="list-style-type: none"> <li>• Driver door switch On or</li> <li>• Assistant door switch On</li> </ul>             |
| Action            | <ul style="list-style-type: none"> <li>• State changed to "Key Hole Illumination On"</li> <li>• Key Hole Illum On</li> </ul> |

### 2. Key Hole Illumination On

#### Condition 1

| State             | Description                                                                                                                                                   |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Key Hole Illumination On" state :                                                                                                                            |
| Event             | <ul style="list-style-type: none"> <li>• IGN1 On or</li> <li>• Bulgar alarm State ARM &amp; Driver door switch Off &amp; Assistant door switch Off</li> </ul> |
| Action            | <ul style="list-style-type: none"> <li>• State changed to "Key Hole Illumination Off"</li> <li>• Key Hole Illumination Off</li> </ul>                         |

# BCM (Body Control Module)

# BE-213

## Condition 2

| State             | Description                                                                                                                                                                            |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Key Hole Illumination On" state :<br>IGN1 Off                                                                                                                                         |
| Event             | Driver door switch Off & Assistant door switch Off                                                                                                                                     |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Key Hole Illumination 30"</li> <li>Start Illumi 30 Timer</li> <li>Key Hole Illumination On (during Illumi 30 Time)</li> </ul> |

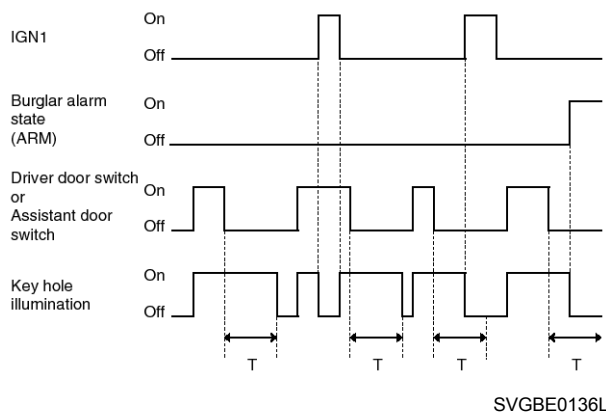
### 3. Key Hole Illumination 30

## Condition 1

| State             | Description                                                                                                                                                             |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Key Hole Illumination 30" state :                                                                                                                                      |
| Event             | <ul style="list-style-type: none"> <li>IGN1 On or</li> <li>Illumi 30 Timer <math>\geq</math> Illumi 30 Time</li> <li>Bulgar alarm State ARM</li> </ul>                  |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Key Hole Illumination Off"</li> <li>Cancel Illumination 30 Timer</li> <li>Key Hole Illumination Off</li> </ul> |

## Condition 2

| State             | Description                                                                                                                                                           |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Key Hole Illumination 30" state :<br>IGN1 Off                                                                                                                        |
| Event             | <ul style="list-style-type: none"> <li>Driver door switch On Or</li> <li>Assistant door switch On</li> </ul>                                                          |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Key Hole Illumination On"</li> <li>Cancel Illumination 30 Timer</li> <li>Key Hole Illumination On</li> </ul> |



T1 : Illumination 30 Time

# BE-214

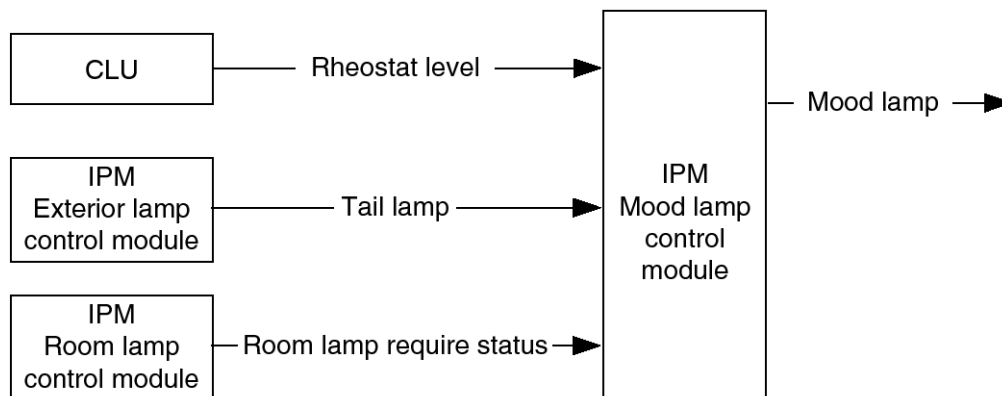
# Body Electrical System

## Mood Lamp Control Function

- Mood lamp On / Off / Dim control

| No | Pre-condition                                             | Event                                                            | Result                                                                   |
|----|-----------------------------------------------------------|------------------------------------------------------------------|--------------------------------------------------------------------------|
| 1  | Tail lamp Off and RoomLamp Off                            | RoomLamp Off → Dim Up                                            | Mood Lamp Dim Up (until PWM 100%)                                        |
| 2  |                                                           | Tail lamp Off → On                                               | Mood Lamp Dim Up (until PWM level %) by Reostate level                   |
| 3  | Tail lamp Off and Room Lamp On                            | (Mood lamp dim up finished)                                      | Mood Lamp On (PWM 100%) (during room lamp on)                            |
| 4  | Tail lamp Off and Room Lamp On<br>Mood Lamp On (PWM 100%) | Tail lamp Off → On                                               | Mood Lamp Dim Down On to (PWM level %) by Reostate level                 |
| 5  | Tail lamp Off and Room Lamp On<br>Mood Lamp On (PWM 100%) | RoomLamp On → Dim Down                                           | Mood Lamp Dim Down with 2seconds delay after                             |
| 6  | Tail lamp Off and Room Lamp On<br>Mood Lamp On (PWM 100%) | Tail lamp Off → On<br>RheostatLevel ≥ 20   <br>RheostatLevel = 0 | Mood Lamp Keep(PWM 100%) and move to state "Mood lamp on by Rheo level " |
| 7  | Mood Lamp Dim Up On                                       | Tail lamp Off → On<br>RheostatLevel < Current Bright level       | Directly Mood Lamp On (PWM level %) by Reostate level                    |
| 8  |                                                           | Tail lamp Off → On<br>RheostatLevel ≥ Current Bright level       | Keep the Mood Lamp Dim Up (until PWM level %) by Reostate level          |
| 9  | Mood Lamp Dim Down On                                     | Tail lamp On → Off                                               | Directly Mood Lamp On (PWM level %) by Reostate level                    |
| 10 |                                                           | RoomLamp Off → Dim Up                                            | Mood Lamp Dim Up (until PWM 100%)                                        |

### [Mood Lamp Diagrams]



SVGBE0137L



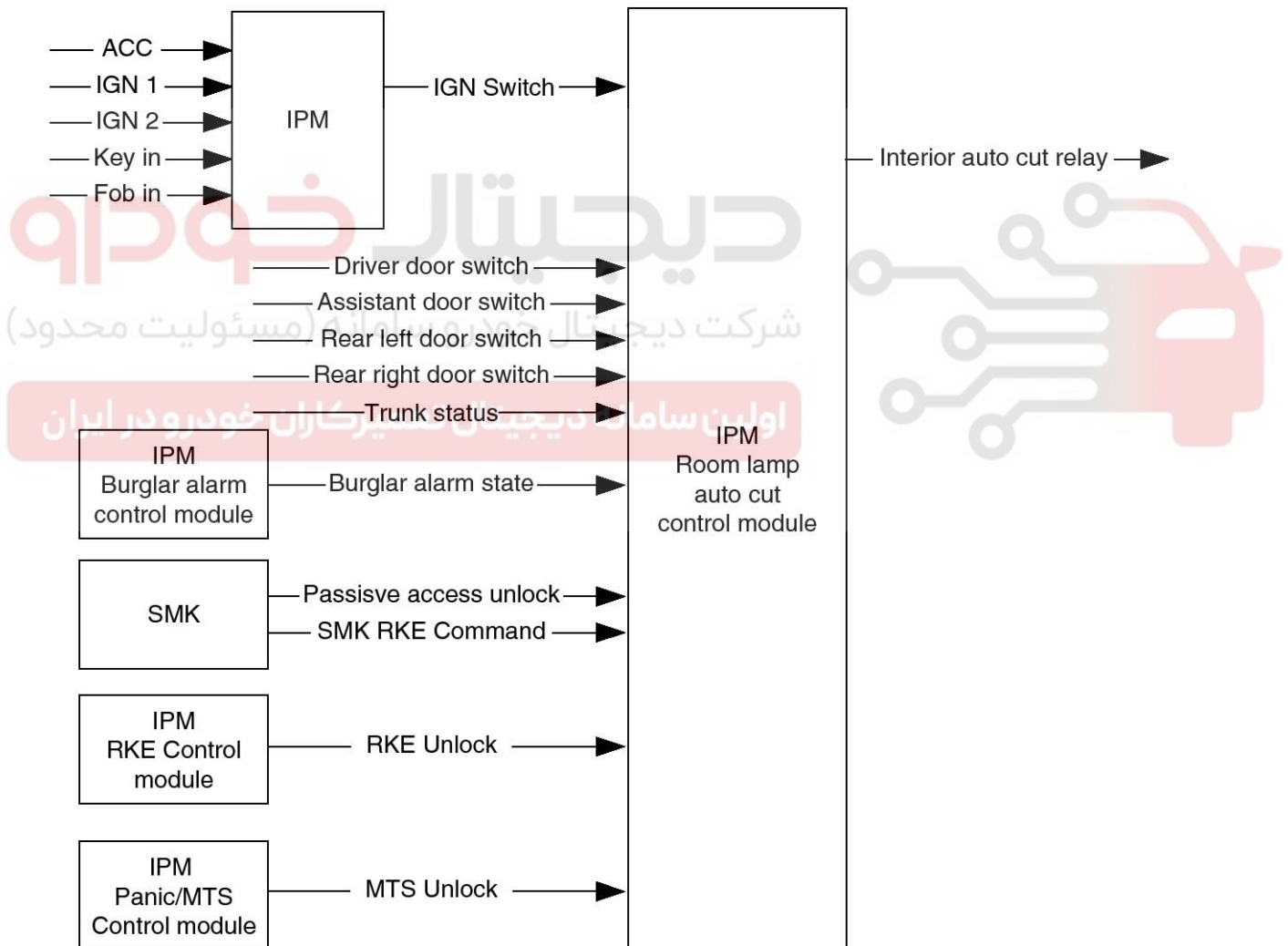
# BCM (Body Control Module)

# BE-215

## Interior Lamp Auto Cut Control

| No | Pre-condition                     | Event                                              | Result                          |
|----|-----------------------------------|----------------------------------------------------|---------------------------------|
| 1  | -                                 | Key Off or KeyIn → ACC, IGN, START                 | Interior Power On               |
| 2  |                                   | Any Door Open                                      |                                 |
| 3  |                                   | Unlock Event                                       |                                 |
| 4  |                                   | Trunk Open                                         |                                 |
| 5  | Interior Power On                 | All Door Close and Trunk Close (Key Off or Key In) | Interior Power Cut after 20 min |
| 6  | Interior Power On (During 20 min) | DISARM → ARM                                       | Interior Power Cut after 20 min |

### [Interior Lamp Auto Cut Diagrams]



SVGBE0138L

**BE-216****Body Electrical System**

## 1. Interior Lamp Autocut Power Off

**Condition 1**

| State             | Description                                                                                                                                                                                          |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Interior Lamp Autocut Off" state :                                                                                                                                                                  |
| Event             | <ol style="list-style-type: none"> <li>1. After ACC On or</li> <li>2. Any Door Open On or</li> <li>3. Unlock Off → On or</li> <li>4. BA State ARM → DISARM or</li> <li>5. Trunk Status On</li> </ol> |
| Action            | <ul style="list-style-type: none"> <li>• State changed to "Interior Lamp Autocut On"</li> <li>• Interior AutoCut Relay On</li> </ul>                                                                 |

## 2. Interior Lamp Autocut Power 3 sec On

**Condition 1**

| State             | Description                                                                                                                            |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Interior Lamp Autocut 3 sec On" state :                                                                                               |
| Event             | Autocut Timer $\geq$ Autocut 3sec Time                                                                                                 |
| Action            | <ul style="list-style-type: none"> <li>• State changed to "Interior Lamp Autocut Off"</li> <li>• Interior AutoCut Relay Off</li> </ul> |

**Condition 2**

| State             | Description                                                                                                                                                                                          |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Interior Lamp Autocut 3 sec On" state :                                                                                                                                                             |
| Event             | <ol style="list-style-type: none"> <li>1. After ACC On or</li> <li>2. Any Door Open On or</li> <li>3. Unlock Off → On or</li> <li>4. BA State ARM → DISARM or</li> <li>5. Trunk Status On</li> </ol> |
| Action            | <ul style="list-style-type: none"> <li>• State changed to "Interior Lamp Autocut On"</li> <li>• Interior AutoCut Relay On</li> <li>• Cancel Autocut Timer</li> </ul>                                 |

## 3. Interior Lamp Autocut Power 20 min On

**Condition 1**

| State             | Description                                                                                                                                                           |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Interior Lamp Autocut 20 min On" state :                                                                                                                             |
| Event             | Autocut Timer $\geq$ Autocut 20min Time                                                                                                                               |
| Action            | <ul style="list-style-type: none"> <li>• State changed to "Interior Lamp Autocut Off"</li> <li>• Start Autocut Timer</li> <li>• Interior AutoCut Relay Off</li> </ul> |

**BCM (Body Control Module)****BE-217****Condition 2**

| State             | Description                                                                                                                                                    |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Interior Lamp Autocut 20 min On" state :                                                                                                                      |
| Event             | 1. After ACC On or<br>2. Any Door Open On or<br>3. Unlock Off → On or<br>4. Bulgar alarm State ARM → DISARM or<br>5. Trunk Status On                           |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Interior Lamp Autocut On"</li> <li>Interior AutoCut Relay On</li> <li>Cancel Autocut Timer</li> </ul> |

**Condition 3**

| State             | Description                                                                                                                                                 |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Interior Lamp Autocut 20 min On" state :                                                                                                                   |
| Event             | Bulgar alarm State ARM                                                                                                                                      |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Interior Lamp Autocut 3 sec On"</li> <li>Start Autocut Timer (during Autocut 3sec Time)</li> </ul> |

## 4. Interior Lamp Autocut Power On

**Condition 1**

| State             | Description                                                                                                                                                   |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Interior Lamp Autocut On" state :                                                                                                                            |
| Event             | After ACC Off and<br>All Door Close On and<br>Trunk Status Off                                                                                                |
| Action            | <ul style="list-style-type: none"> <li>State changed to "Interior Lamp Autocut 20 min On"</li> <li>Start Autocut Timer (during Autocut 20min Time)</li> </ul> |

# BE-218

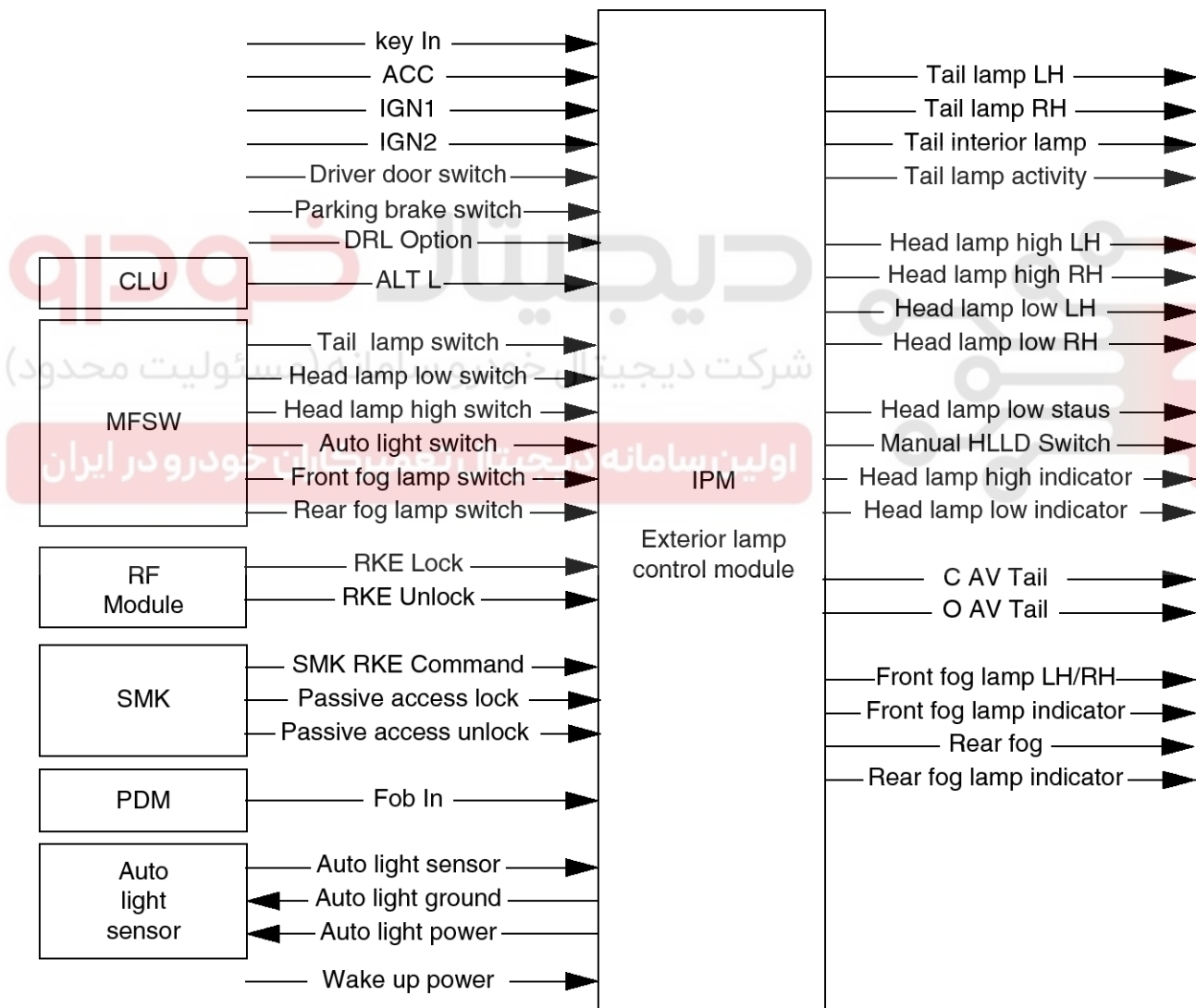
# Body Electrical System

## Exterior Light System

The Exterior Light System offers the following features :

1. Tail Lamp Control
  - 1) Tail Lamp On/ Off
  - 2) Escort
  - 3) Tail Lamp Autocut
2. Head Lamp Control
  - 1) Head Lamp Low On/ Off
  - 2) Head Lamp High On/ Off
  - 3) Escort
  - 4) DRL : Daytime Running Lights
3. Auto Light Control
  - 1) Tail Auto
  - 2) Head Auto
  - 3) AV tail Auto
4. Front Fog Lamp Control
  - 1) Non NA Front Fog: depend on tail lamp
  - 2) NA Front Fog: depend on head lamp
5. Rear Fog Lamp Control
6. Puddle Lamp Control
  - 1) Puddle On/ Off
  - 2) Puddle On/ Off by Welcome Light

### [Puddle Lamp System Diagrams]

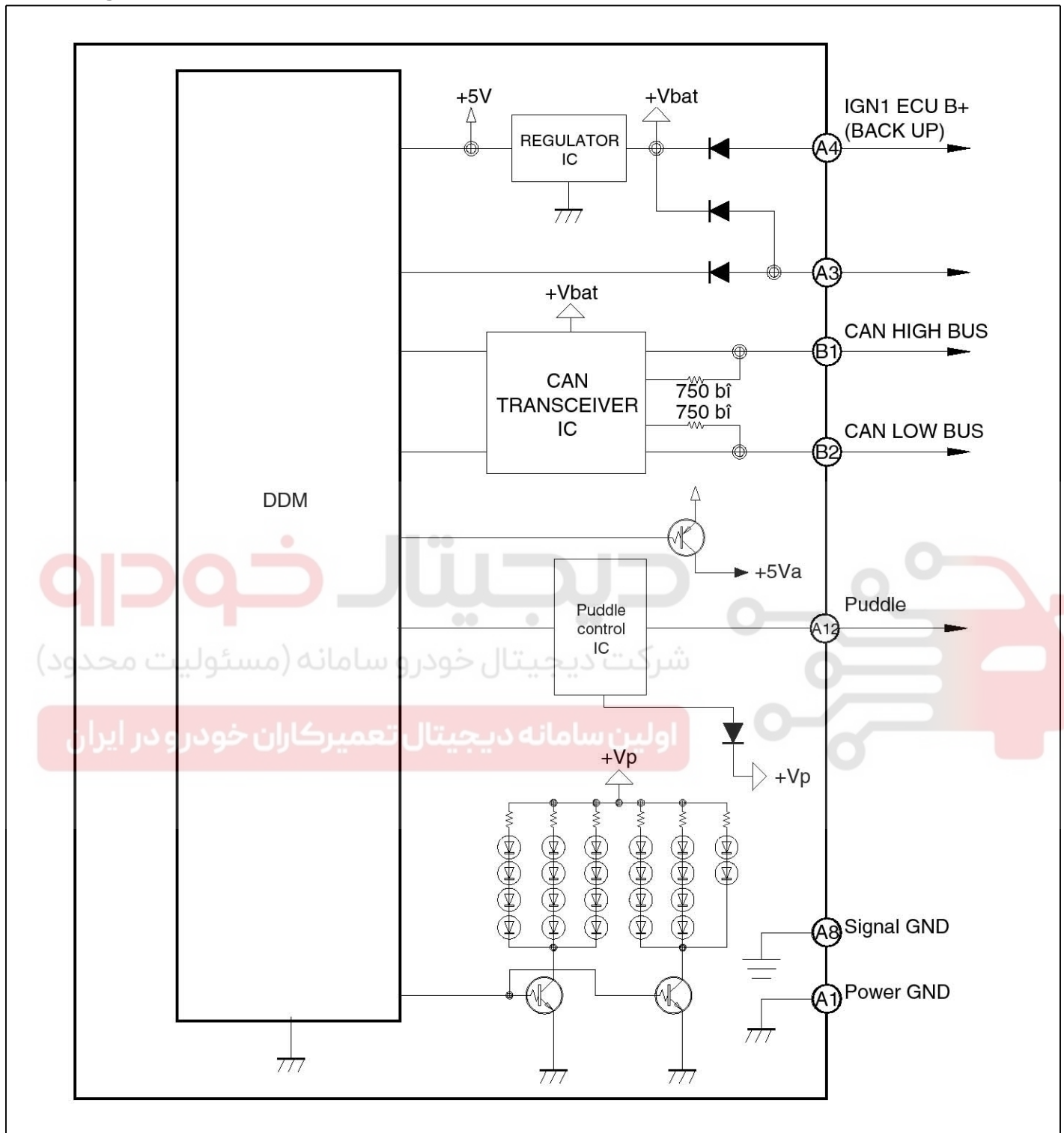


SVGBE0139L

# BCM (Body Control Module)

# BE-219

[DDM Diagrams]

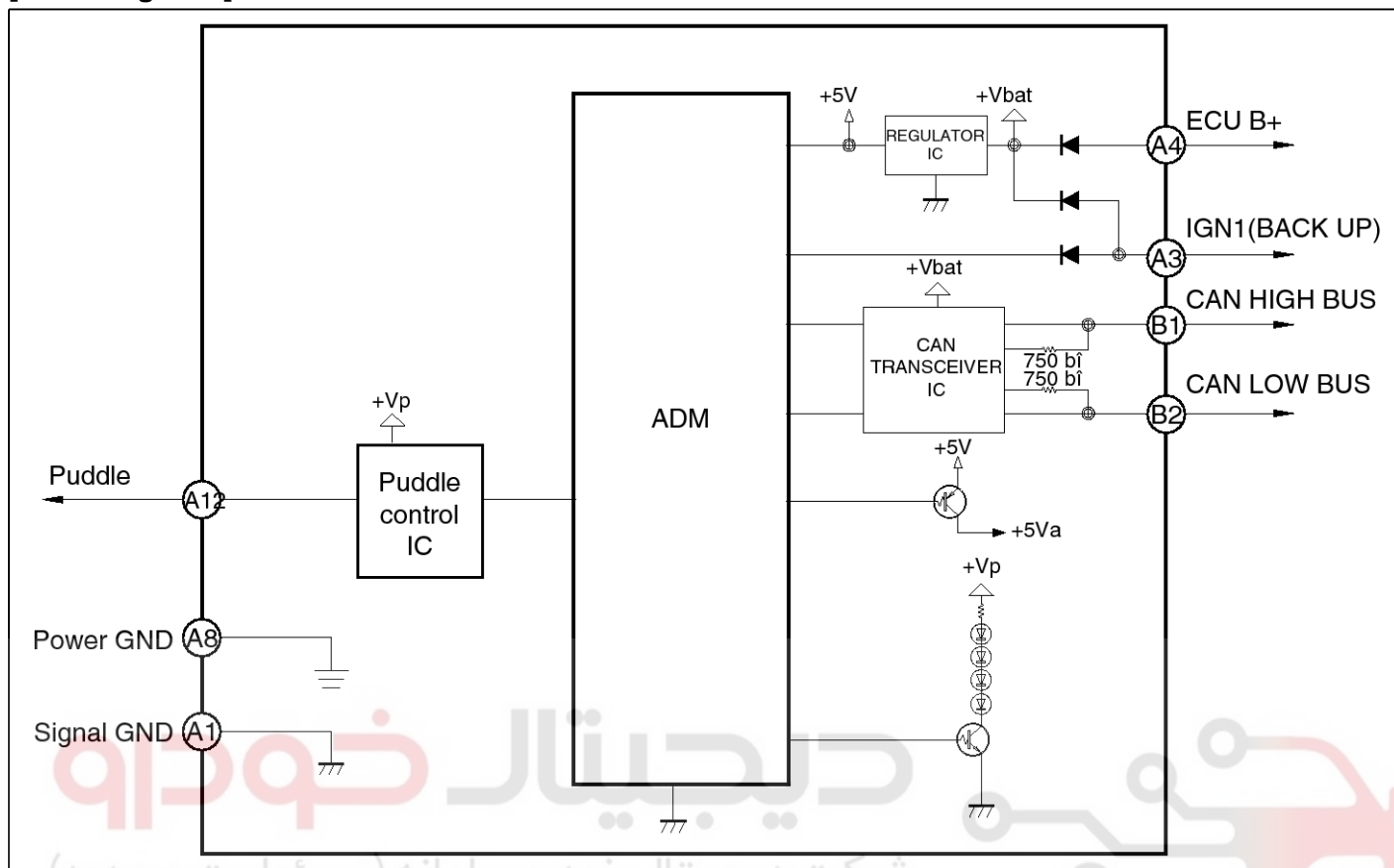


SVGBE0140L

# BE-220

# Body Electrical System

[ADM Diagrams]



دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

SVGBE0141L

# BCM (Body Control Module)

# BE-221

## Tail Lamp Control Function

This function describes the following features :

- Turn on and off Tail Lamp by switch input.
- Turn on and off Tail Lamp in Auto Light Control command.
- Automatically cut off Tail Lamps if a driver forgets to turn them off.

- Output control of Tail Lamp
- Turn on and off Tail Lamp in Head Lamp Welcome Control command.

| No | Pre-condition                                                                | Event                | Result           |
|----|------------------------------------------------------------------------------|----------------------|------------------|
| 1  | -                                                                            | Tail Switch Off → On | Tail On          |
| 2  | IGN, START, Snsr ≤ On                                                        | Auto Switch Off → On | Tail On          |
| 3  | IGN, START, Snsr > On                                                        |                      | Tail Off         |
| 4  | Key Off, Key In, ACC                                                         |                      |                  |
| 5  | Tail On, Escort option                                                       | IGN On → Off         | Tail On maintain |
| 6  | Tail On, Escort option Off, Key Off                                          | DRV door open        | Tail Off         |
| 7  | Tail Off, Escort option, Tail switch or Auto switch on and Sensor > On level | Head Welcome "on"    | Tail On          |

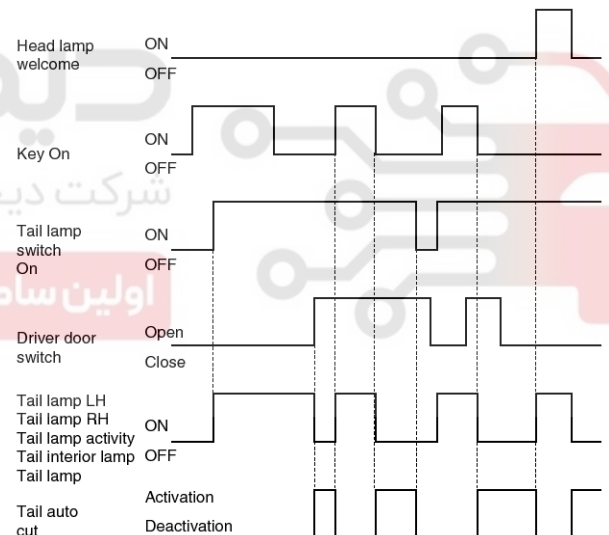
### Tail Auto Cut Function Condition

The "Tail Auto Cut" strategy ensures that Tail lamps are turned off even if a driver forgets to turn them off.

When the Tail lamp is turned on by Tail lamp SW, after key insertion, and if a user removes key and opens the driver side door(or vice versa), the Tail lamps are automatically turned off.

While "Tail Auto Cut" function is active, if a user turns off the Tail lamp switch or inserts key again, "Tail Auto Cut" function will be deactivated.

While "Tail Auto Cut" function is active, if "Head Lamp Welcome" signal received "Tail Auto Cut" function will be deactivated during "Head Lamp Welcome" signal on.



SVGBE0142L



**BE-222****Body Electrical System**

## 1. Tail Lamp Off

**Transition 1**

| State             | Description                                                                                                                                                                                                                                                         |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• "Tail Lamp Off" STATE</li> <li>• Tail auto cut marker not set (Tail AutoCut Off)</li> </ul>                                                                                                                                |
| Event             | <ul style="list-style-type: none"> <li>• Tail lamp input conditions for activation (Tail Lamp switch On)</li> </ul>                                                                                                                                                 |
| Action            | <ul style="list-style-type: none"> <li>• Turn on Tail lamps :</li> <li>• Tail Lamp LH On</li> <li>• Tail Lamp RH On</li> <li>• Tail Interior Lamp On</li> <li>• Tail Lamp Activity On</li> <li>• Tail Lamp On</li> <li>• State changes to "Tail Lamp On"</li> </ul> |

**Transition 2**

| State             | Description                                                                                                                     |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• "Tail Lamp Off" STATE</li> <li>• Tail auto cut marker set (Tail AutoCut On)</li> </ul> |
| Event             | Tail lamp input conditions for activation (Tail Lamp switch On)                                                                 |
| Action            | State changes to "Tail Auto Cut"                                                                                                |

**Transition 3**

| State             | Description                                                                                                                                                                                                                                                         |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• "Tail Lamp Off" STATE</li> <li>• Don't care about Tail auto cut marker</li> <li>• Tail Lamp switch State On</li> </ul>                                                                                                     |
| Event             | Head lamp Welcome input conditions for activation (Head Welcome On)                                                                                                                                                                                                 |
| Action            | <ul style="list-style-type: none"> <li>• Turn on Tail lamps :</li> <li>• Tail Lamp LH On</li> <li>• Tail Lamp RH On</li> <li>• Tail Interior Lamp On</li> <li>• Tail Lamp Activity On</li> <li>• Tail Lamp On</li> <li>• State changes to "Tail Lamp On"</li> </ul> |

# BCM (Body Control Module)

## BE-223

### 2. Tail Lamp On

#### Transition 1

| State             | Description                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>“Tail Lamp On” STATE</li> <li>Head lamp Welcome input conditions for deactivation (Head Welcome Off)</li> </ul>                                                                                                                                                                                                                                             |
| Event             | Tail lamp input conditions for deactivation (Tail Lamp switch Off)                                                                                                                                                                                                                                                                                                                                 |
| Action            | <ul style="list-style-type: none"> <li>Turn off Tail lamps</li> <li>Tail Lamp LH Off</li> <li>Tail Lamp RH Off</li> <li>Tail Interior Lamp Off</li> <li>Tail Lamp Activity Off</li> <li>Tail Lamp Off</li> <li>Reset marker for Key In transition Off → On</li> <li>Reset marker for Driver Door open</li> <li>Reset Tail auto cut marker set</li> <li>State changes to “Tail Lamp Off”</li> </ul> |

#### Transition 2

| State             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>“Tail Lamp On” STATE</li> <li>Marker for Escort is not</li> <li>Tail lamp input conditions for activation</li> <li>Marker for Key in transition is set</li> </ul>                                                                                                                                                                                                                                     |
| Event             | Key Off & (DRV DR SW On or DD switch Marker On)                                                                                                                                                                                                                                                                                                                                                                                              |
| Action            | <ul style="list-style-type: none"> <li>Turn off Tail lamps</li> <li>Tail Lamp LH Off</li> <li>Tail Lamp RH Off</li> <li>Tail Interior Lamp Off</li> <li>Tail Lamp Activity Off</li> <li>Tail Lamp Off</li> <li>Set Tail auto cut marker set (Tail AutoCut On)</li> <li>Set Tail auto cut marker set (Tail AutoCut On)</li> <li>Reset marker for driver door open (DD switch Marker Off)</li> <li>State changes to “Tail Auto Cut”</li> </ul> |

#### Transition 3

| State             | Description                                                                                                                                                                                                    |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>“Tail Lamp On” STATE</li> </ul>                                                                                                                                         |
| Event             | Key On active state (Key On)                                                                                                                                                                                   |
| Action            | <ul style="list-style-type: none"> <li>Set marker for Key in transition Off → On</li> <li>Reset marker for driver door open</li> <li>Reset Tail auto cut marker set</li> <li>State does not changed</li> </ul> |

## BE-224

## Body Electrical System

## Transition 4

| State             | Description                                                                                                                   |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• "Tail Lamp On" STATE</li> <li>• Tail lamp input conditions for activation</li> </ul> |
| Event             | Condition for Escort active                                                                                                   |
| Action            | <ul style="list-style-type: none"> <li>• State changes to "Escort Tail"</li> </ul>                                            |

## Transition 5

| State             | Description                                                                                                                                                                                                                                                   |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• "Tail Lamp On" STATE</li> <li>• Tail lamp input conditions for activation</li> <li>• Tail auto cut marker for activation</li> </ul>                                                                                  |
| Event             | Head lamp Welcome input conditions for deactivation                                                                                                                                                                                                           |
| Action            | <ul style="list-style-type: none"> <li>• Turn off Tail lamps</li> <li>• Tail Lamp LH Off</li> <li>• Tail Lamp RH Off</li> <li>• Tail Interior Lamp Off</li> <li>• Tail Lamp Activity Off</li> <li>• Tail Lamp Off</li> </ul> State changes to "Tail Auto Cut" |

## 3. Escort Tail

## Transition 1

| State             | Description                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | "Escort Tail" STATE                                                                                                                                                                                                                                                                                                                                                                                                    |
| Event             | Tail lamp input conditions for deactivation                                                                                                                                                                                                                                                                                                                                                                            |
| Action            | <ul style="list-style-type: none"> <li>• Turn off Tail lamps</li> <li>• Tail Lamp LH Off</li> <li>• Tail Lamp RH Off</li> <li>• Tail Interior Lamp Off</li> <li>• Tail Lamp Activity Off</li> <li>• Tail Lamp Off</li> <li>• Reset marker for Key in transition Off → On</li> <li>• Reset Tail auto cut marker set</li> <li>• Reset marker for driver door open</li> <li>• State changes to "Tail Lamp Off"</li> </ul> |

## Transition 2

| State             | Description                                                                                                                  |
|-------------------|------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• "Escort Tail" STATE</li> <li>• Tail lamp input conditions for activation</li> </ul> |
| Event             | Condition for Escort inactive                                                                                                |
| Action            | <ul style="list-style-type: none"> <li>• State changes to "Tail Lamp On"</li> </ul>                                          |

# BCM (Body Control Module)

## BE-225

### Transition 3

| State             | Description                                                                                                            |
|-------------------|------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• "Escort Tail" STATE</li> <li>• Marker for driver door open not set</li> </ul> |
| Event             | Driver door open                                                                                                       |
| Action            | <ul style="list-style-type: none"> <li>• Set marker for driver door open</li> <li>• State does not changed</li> </ul>  |

### 4. Tail Auto Cut

### Transition 1

| State             | Description                                                                                                                    |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• "Tail Auto Cut" STATE</li> </ul>                                                      |
| Event             | <ul style="list-style-type: none"> <li>• Tail lamp input conditions for deactivation</li> </ul>                                |
| Action            | <ul style="list-style-type: none"> <li>• Reset Tail auto cut marker set</li> <li>• State changes to "Tail Lamp Off"</li> </ul> |

### Transition 2

| State             | Description                                                                                                                                                                                                                                                                                                   |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• "Tail Auto Cut" STATE</li> <li>• Tail lamp input conditions for activation</li> </ul>                                                                                                                                                                                |
| Event             | Key On active state or SBB pressed Key On                                                                                                                                                                                                                                                                     |
| Action            | <ul style="list-style-type: none"> <li>• Turn on Tail lamps :</li> <li>• Tail Lamp LH On</li> <li>• Tail Lamp RH On</li> <li>• Tail Interior Lamp On</li> <li>• Tail Lamp Activity On</li> <li>• Tail Lamp On</li> <li>• Reset Tail auto cut marker set</li> <li>• State changes to "Tail Lamp On"</li> </ul> |

### Transition 3

| State             | Description                                                                                                                                                                                                                                                         |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Initial Condition | <ul style="list-style-type: none"> <li>• "Tail Auto Cut" STATE</li> <li>• Tail lamp input conditions for activation</li> </ul>                                                                                                                                      |
| Event             | Head lamp Welcome input conditions for activation                                                                                                                                                                                                                   |
| Action            | <ul style="list-style-type: none"> <li>• Turn on Tail lamps :</li> <li>• Tail Lamp LH On</li> <li>• Tail Lamp RH On</li> <li>• Tail Interior Lamp On</li> <li>• Tail Lamp Activity On</li> <li>• Tail Lamp On</li> <li>• State changes to "Tail Lamp On"</li> </ul> |

**BE-226****Body Electrical System****Head Lamp Control Function**

1. Turn on and off Head Lamp Low by Head Lamp Low Switch input.
2. Turn on and off Head Lamp Low by Escort Function. (Include Escort Welcome)
3. Turn on and off Head Lamp Low by Auto Light Control Request.
4. Turn on and off Head Lamp High by Head Lamp High Switch input.

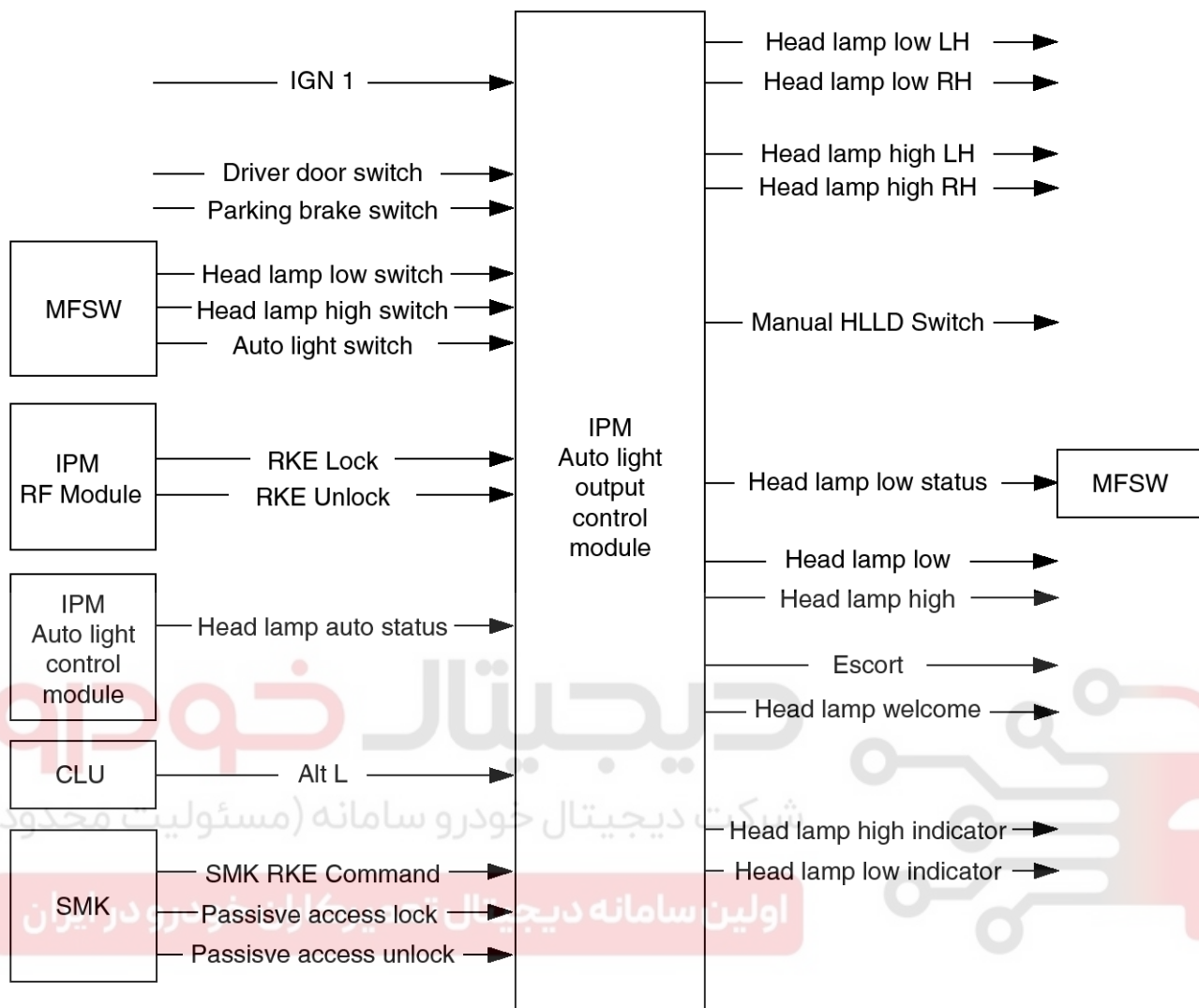
5. Turn on and off Head Lamp High and Low by Passing Switch Input.
6. Output control of Head Lamp Low.
7. Output control of Head Lamp High.
8. Output control of Head Lamp High Indicator.
9. Output control of HLLD (Head Lamp Level Device)

| No | Pre-condition                                          | Event                               | Result                          |
|----|--------------------------------------------------------|-------------------------------------|---------------------------------|
| 1  | IGN                                                    | Head Low switch<br>Off → On         | Head Low On                     |
| 2  | Head Low switch On, START                              | START → IGN                         |                                 |
| 3  | IGN, START, Snsr ≤ On level                            | Auto Switch Off → On                |                                 |
| 4  | IGN, START, Snsr > On level                            |                                     |                                 |
| 5  | Key Off, Key In, ACC                                   |                                     |                                 |
| 6  | Head Low On                                            | IGN → START                         | Head Low Off                    |
| 7  | Head Low On, Escort option                             | IGN → ACC, Key In,<br>Key Off       | Head Low On<br>(Escort 20min)   |
| 8  | Head Low On, Escort option, IGN Off                    | DRV door Open                       |                                 |
| 9  | Head Low On, Escort option, Key Off                    | DRV door Open → Close               | Head Low On<br>(Escort 30sec)   |
| 10 | Parking Brake switch Off,<br>All Head Lamp switch Off  | IGN → START → IGN<br>(Alt L On)     | DRL running                     |
| 11 | KeyOff, Escort option, Lamp Off                        | Unlock<br>Event and Snsr ≤ On level | Head Low On<br>(Welcome 15 sec) |
| 12 | Key Off, Escort option, Lamp Off<br>Head Low switch On | Unlock Event                        | Head Low On<br>(Welcome 15 sec) |

# BCM (Body Control Module)

# BE-227

## [Head Lamp Control Diagrams]



SVGBE0143L

### Head Lamp Low Control

In IGN terminal State (IGN ON), if turn on the Head Lamp LOW SW ON, Head Lamp LOW outputs are turned on (Head Lamp Low LH & Head Lamp Low RH ON) and Head Lamp Low IND is turn on.

In IGN terminal State (IGN ON), if turn on the Head Lamp LOW SW ON, Head Lamp LOW outputs are turned on (Head Lamp Low LH & Head Lamp Low RH ON) and Head Lamp Low IND is turn on.

### Head Lamp High Control

In IGN terminal State (IGN ON) and Head Lamp Low On, if turn on the Head Lamp High SW, Head Lamp High Outputs are turned on and Head Lamp High IND is turn on.

Also, In Auto light mode, If Head Lamp High switch turns on, when Head lamp Low is 'on' then Head Lamp High activation.

So, in this case used head lamp low output signal. this signal is active low.

When Head Lamp Low On condition, head high lamp multifunction switch activated.

When Head Lamp Low Off condition, head high lamp could not on activation, even if multifunction switch on.

It is following HW connection (reference of IPM Spec) Head Lamp High and Passing control one line connection.

### Passing Control

In IGN terminal State (IGN ON), If Head Lamp Passing Switch Input (Passing SW ON) is detected then Head Lamp High Output are turned on and Head Lamp Low Output at the same time and Head Lamp High IND is set to on.

# BE-228

# Body Electrical System

## Escort Function

### 1. Escort

After user generates the call of head lamp low light, if switch off ignition, and then keep Head Lamp Low Output On state during 20min.

During active "Escort Function", if receive Lock request 2 times or cancel the lighting request of head lamp low, this function is released.

Lock request counting for 2 times is each follow cases :

1. RKE Lock On
2. SMK RKE CMD Lock
3. Passive Access Lock

If driver door close event (DRV DR SW On→Off) occurs in Escort 20min state, the lock counter must be cleared.

If driver door opened (DRV DR SW On) occurs in Escort 30sec state, the lock counter must be cleared.

After first locking, lock counter will be kept even if unlock event is appeared before second lock event.

### 2. Escort Welcome

Escort Welcome functions activated by unlock command, when Head Lamp Switch On or Auto On condition (Auto State on and Sensor level on).

Escape condition for Escort Welcome like follow :

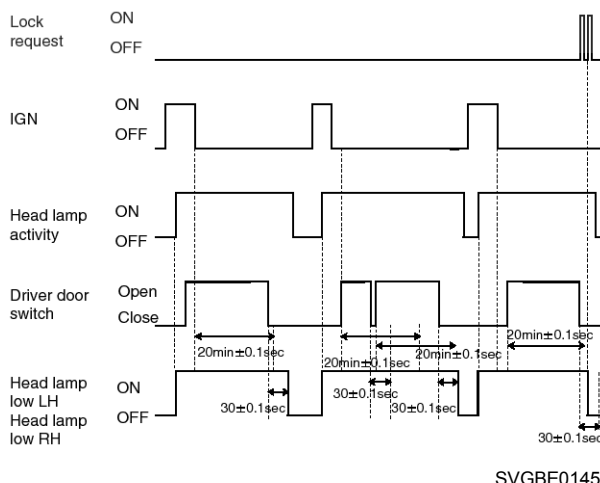
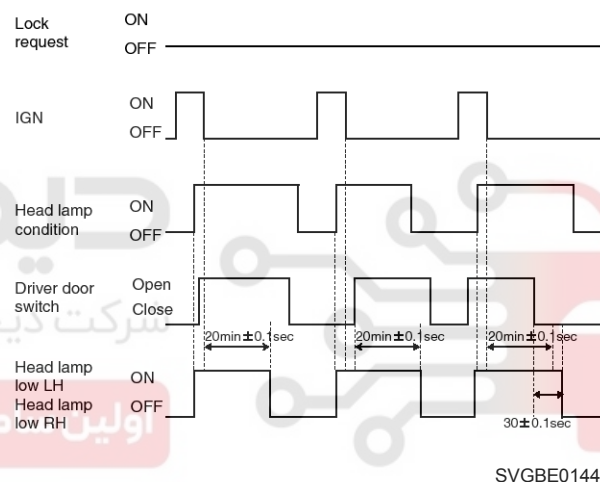
- 1) If M/S SW changed (AUTO between H/LAMP)
- 2) Unlock (RKE Unlock, SMK RKE CMD, Passive Access Unlock)
- 3) Lock (RKE Lock, SMK RKE CMD, Passive Access Lock)
- 4) Cranking (START On)
- 5) Welcome15 Timer expired.

### 3. Additional Note

- 1) While escort function is activated, Tail lamp is keeping the turn on state and does not go to Autocut and after finish escort state and user removes key, it can go Autocut mode.
- 2) While the "Escort Function" is activated by 'Head Lamp Low Switch', if change from 'Head Lamp Low Switch' to 'Lamp Auto Switch', "Escort Function" is deactivated, because Lamp Auto mode is 'Lamp Off' condition.
- 3) While the "Escort Function" is activated by 'Lamp Auto Switch', if change from 'Lamp Auto Switch' to 'Head Lamp Low Switch', "Escort Function" is

keeping the activation state, because of 'Head Lamp On' condition.

- 4) After IGN terminal off 20 minute timers is started, but as soon as door is opened and closed then 30sec timer is engaged.
- 5) The enablement/disablement of Escort Function can be set by UMS function. - [Escort HLN Value Set]
- 6) When the Escort operated, If the terminal state is changed B+ to START directly (SMK case), then Lamp should be off and next when terminal state changing to IGN, then Lamp should be "On"
- 7) While the "Escort Function" is activated, Head Lamp Welcome could not activate.
- 8) While the "Escort Welcome Function" is activated, Tail Lamp is also linked.



### 4. HLLD (Head Lamp Level Device)

Head Lamp Level Device is enabled by head lamp low output. (Manual HLLD switch)

It is controlled HLLD actuator by variable resistance.



# BCM (Body Control Module)

# BE-229

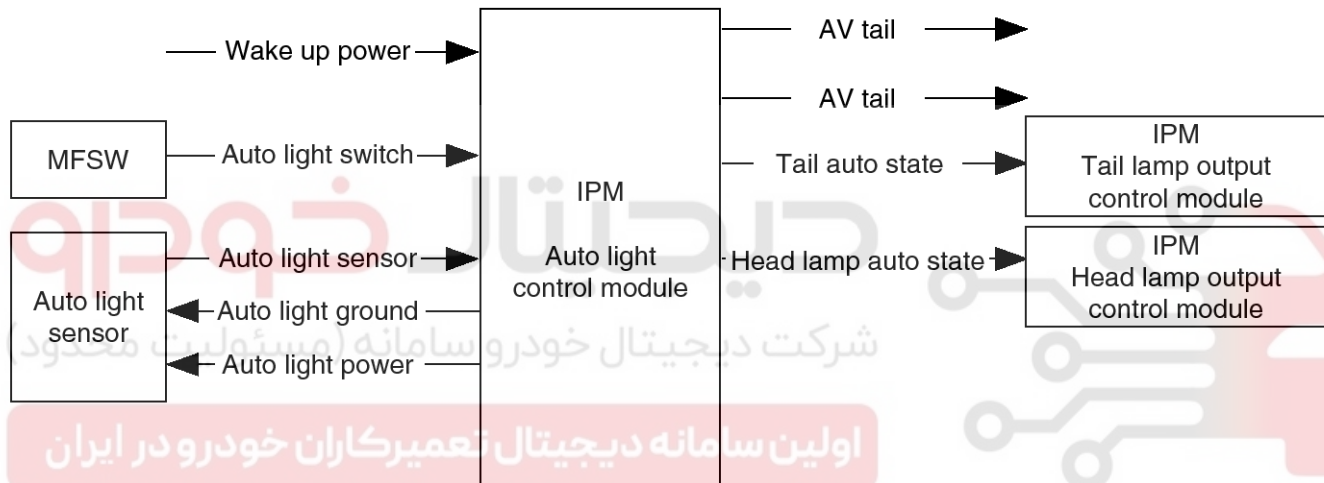
## Auto Light Control Function

This function describes the following features

1. Input detection by Auto Light Sensor.
2. Generate Auto Light Out Status data.
3. Send Auto Light Out Status.
4. Tail Lamp Control by Auto light Mode.
5. Head Lamp Low Control by Auto light Mode.
6. AV Tail Control by Auto Light sensor level.

| Variant | Description    |                |                |                |                  |                   |
|---------|----------------|----------------|----------------|----------------|------------------|-------------------|
|         | Tail ON Level  | Tail OFF Level | Head ON Level  | Head OFF Level | AV Tail ON Level | AV Tail OFF Level |
| CHINA   | 0.52 ± 0.03[V] | 1.58 ± 0.05[V] | 0.52 ± 0.03[V] | 1.58 ± 0.05[V] | 0.52 ± 0.03[V]   | 1.58 ± 0.05[V]    |
| MID     | 0.52 ± 0.03[V] | 1.58 ± 0.05[V] | 0.52 ± 0.03[V] | 1.58 ± 0.05[V] | 0.52 ± 0.03[V]   | 1.58 ± 0.05[V]    |
| GEN     | 0.52 ± 0.03[V] | 1.58 ± 0.05[V] | 0.52 ± 0.03[V] | 1.58 ± 0.05[V] | 0.52 ± 0.03[V]   | 1.58 ± 0.05[V]    |

## [Auto Light Control Diagrams]

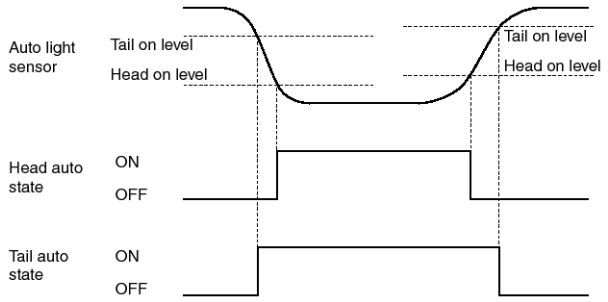


SVGBE0146L

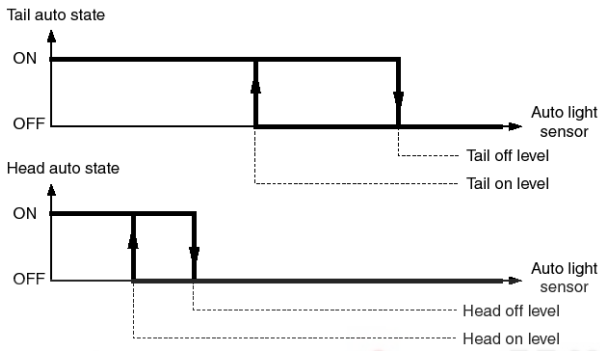
# BE-230

# Body Electrical System

## Tail / Head Lamp Control

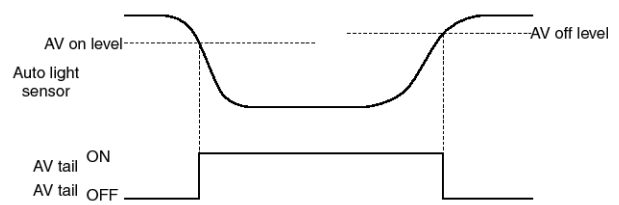


SVGBE0147L

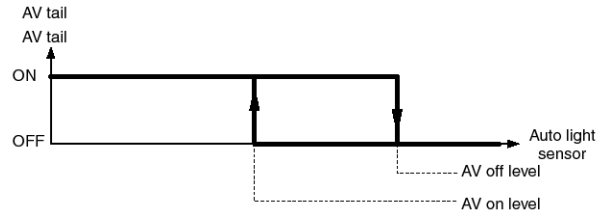


SVGBE0148L

## AV Tail Control



SVGBE0149L



SVGBE0150L

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



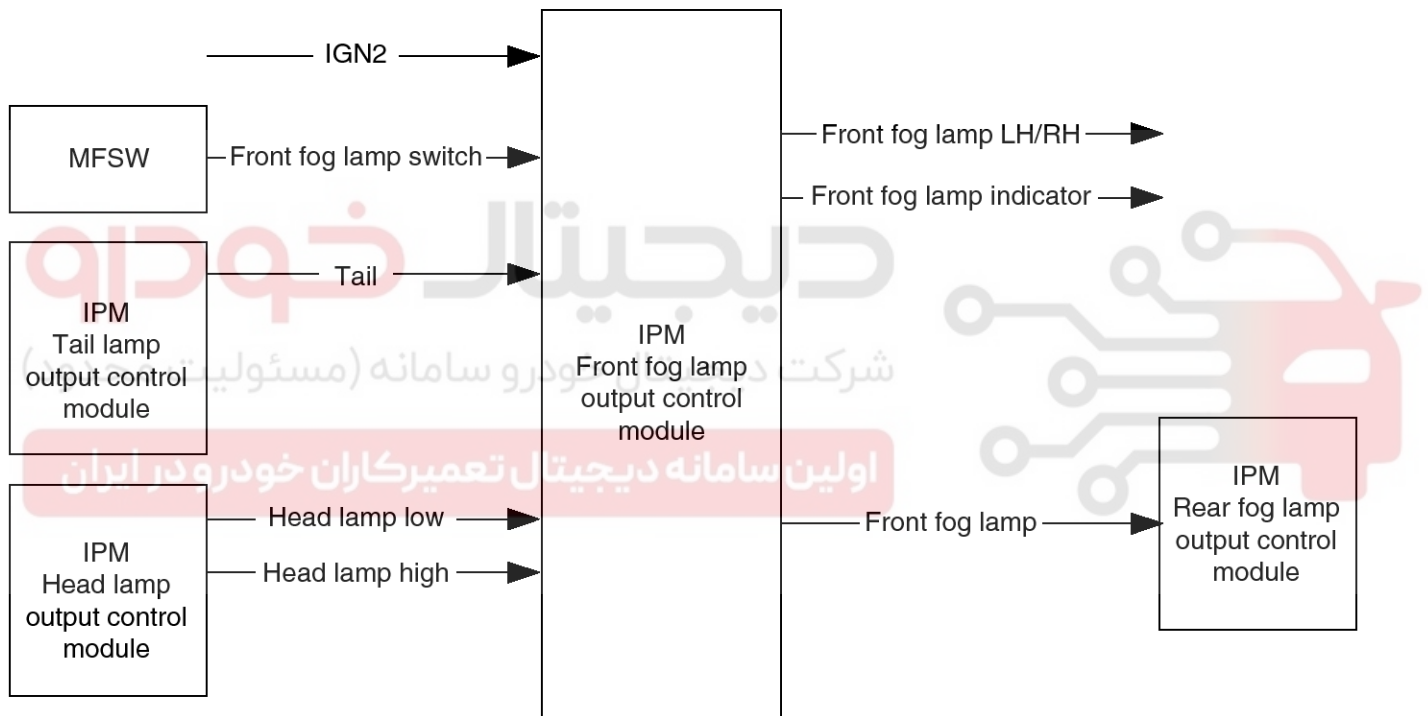
# BCM (Body Control Module)

# BE-231

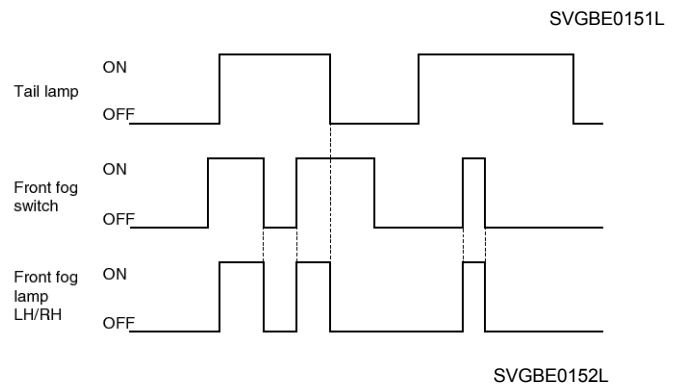
## Front Fog Lamp Control Function

| No | Pre-condition                                                          | Event                     | Result             |
|----|------------------------------------------------------------------------|---------------------------|--------------------|
| 1  | Non NA option, Tail lamp ON                                            | Front fog switch OFF → ON | Front fog lamp ON  |
| 2  | Non NA option, Tail lamp ON, Front fog lamp ON                         | Front fog switch ON → OFF | Front fog lamp OFF |
| 3  |                                                                        | Tail lamp OFF             |                    |
| 4  | Non NA option, Head low lamp ON, Head high lamp OFF                    | Front fog switch OFF → ON | Front fog lamp ON  |
| 5  | Non NA option, Front fog lamp ON, Head low lamp ON, Head high lamp OFF | Front fog switch ON → OFF | Front fog lamp OFF |
| 6  |                                                                        | Head low lamp ON → OFF    |                    |
| 7  |                                                                        | Head low lamp OFF → ON    |                    |

## [Front Fog Lamp Control Diagrams]



In case of Tail Lamp Output On (Tail Lamp On), if Front Fog Lamp Switch input is detected (Front Fog SW On), Front Fog Lamp outputs (Front Fog LHRH On) is turned ON.



## BE-232

## Body Electrical System

## Rear Fog Lamp Control Function

| No | Pre-condition                                                   | Event                                        | Result            |
|----|-----------------------------------------------------------------|----------------------------------------------|-------------------|
| 1  | IGN On, Tail Lamp On, Head Low Lamp On,<br>Front Fog Switch On  | Rear Fog Switch Push                         | Rear Fog Lamp On  |
| 2  | IGN On, Tail Lamp On, Front Fog Lamp On,<br>Front Fog Switch On |                                              |                   |
| 3  | START, Rear Fog Lamp Off,<br>Rear Fog Lamp On condition         | START → IGN                                  | Rear Fog Lamp On  |
| 4  | Rear Fog Lamp On                                                | Front Fog Switch On,<br>Rear Fog Switch Push | Rear Fog Lamp Off |
| 5  |                                                                 | Front Fog Switch On → Off                    |                   |
| 6  |                                                                 | Front Fog Lamp Off,<br>Head Low Lamp Off     |                   |
| 7  |                                                                 | Tail Lamp Off                                |                   |
| 8  |                                                                 | IGN → ACC, KeyIn, KeyOff                     |                   |
| 9  |                                                                 | IGN → START                                  |                   |

# دیجیتال خودرو

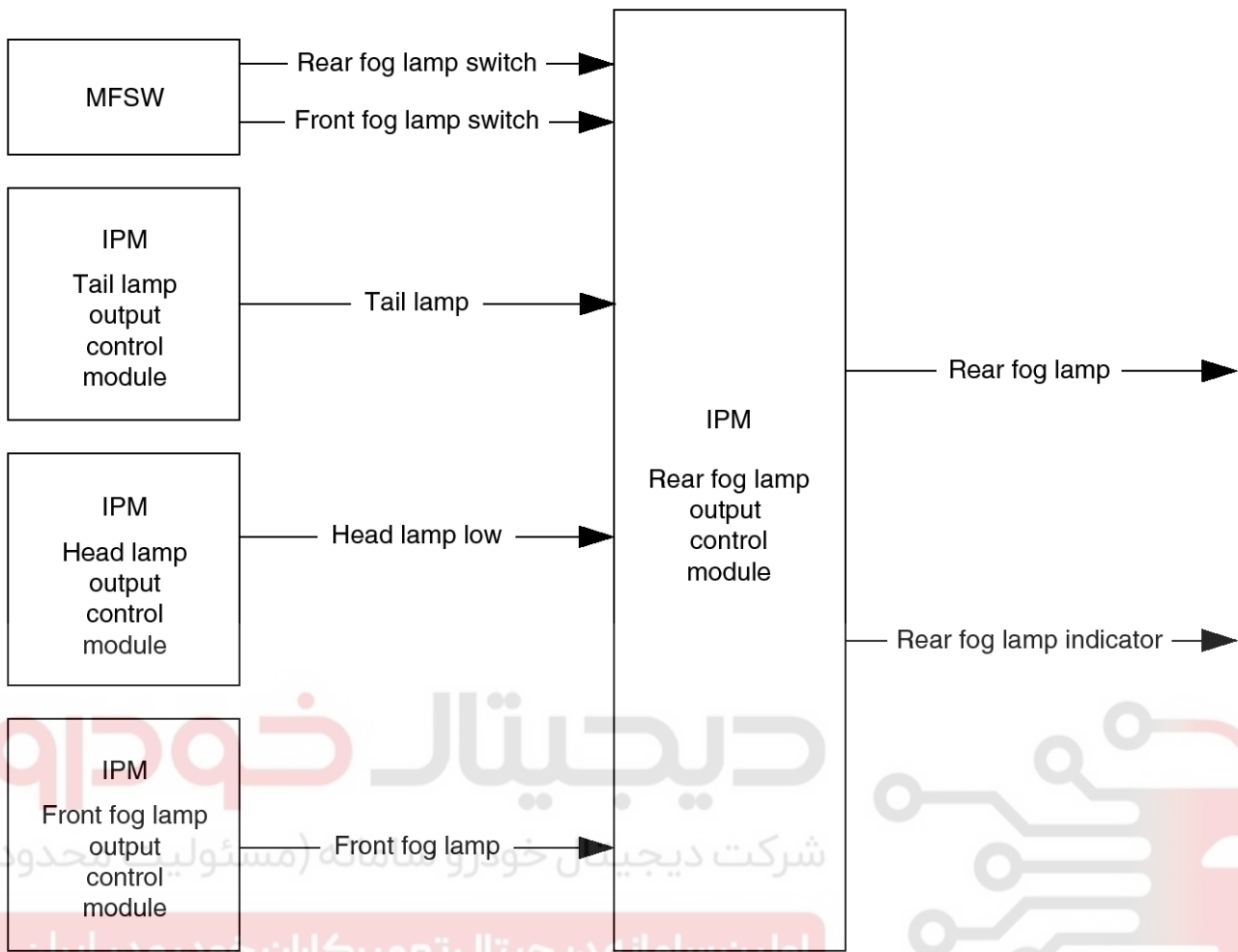
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



# BCM (Body Control Module)

# BE-233

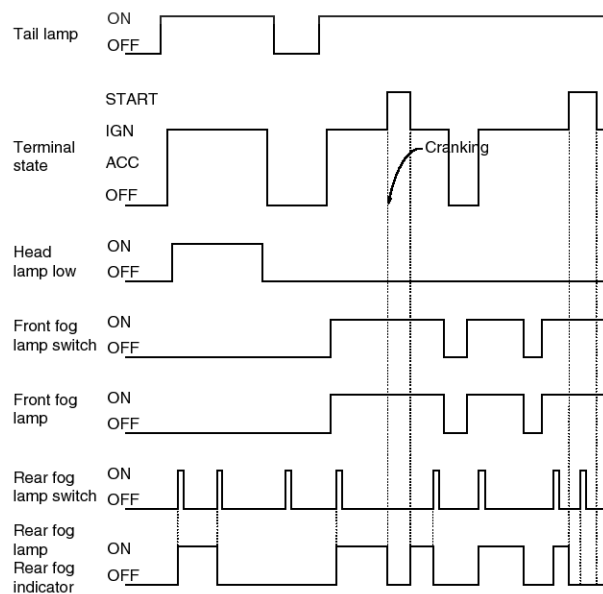


دیجیتال خودرو  
شرکت دیجیتال خودرو سامان (مسئولیت محدود)  
اولین سامان دیجیتال تعمیرکاران خودرو در ایران

While IGN terminal state (IGN On) front fog lamp is on (Front Fog Lamp On), if user activates the rear fog lamp switch (Rear Fog SW Off → On) Rear Fog Lamp output (Rear Fog On) is turned on and CAN signal indicator is sent (Rear Fog IND).

When rear fog lamp is ON (Rear Fog On), if user tries to crank then rear fog lamp is turned Off during the cranking (Rear Fog Off).

Rear fog lamp switch wire depend on front fog lamp.



SVGBE0153L

SVGBE0154L

## BE-234

## Body Electrical System

## Puddle Lamp Control Function

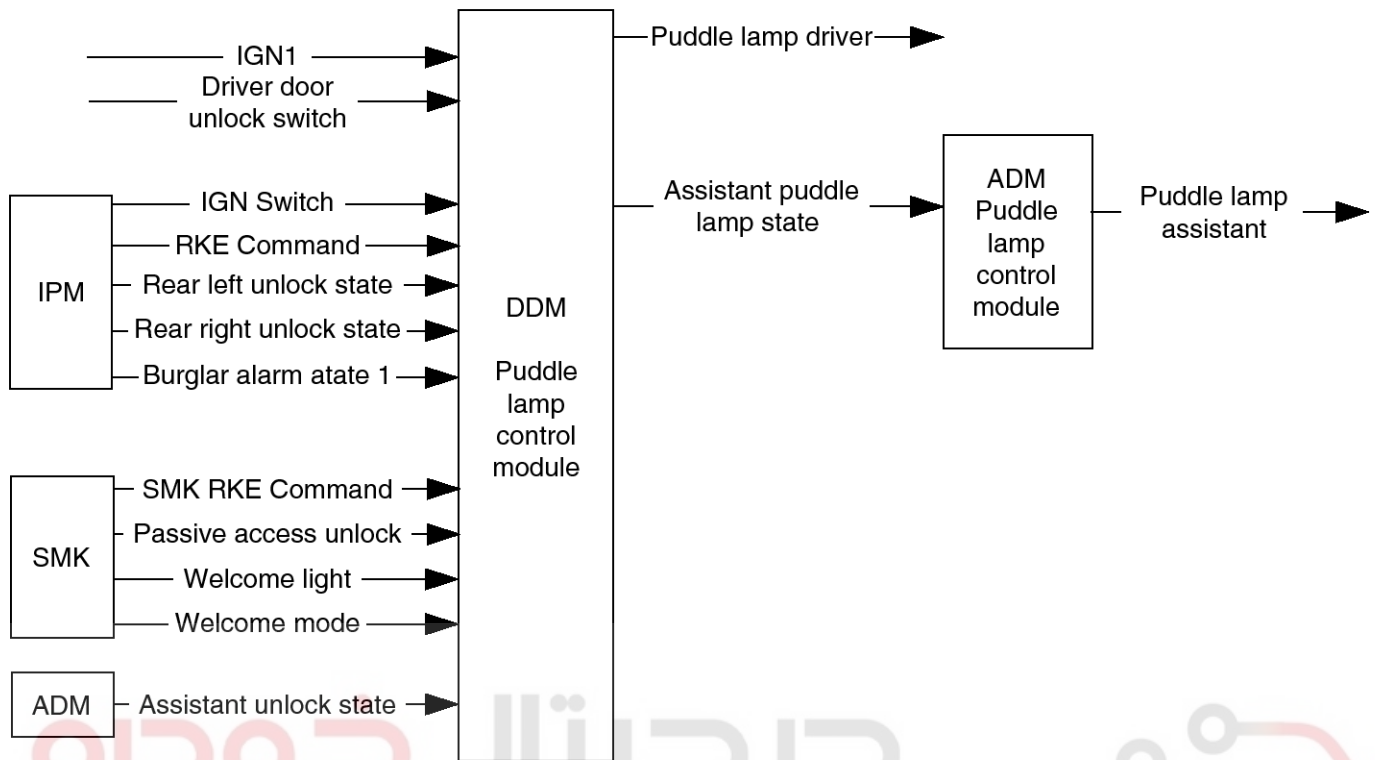
- Front Left Puddle Lamp On / Off / Decaying Control
- Front Right Puddle Lamp On / Off / Decaying Control

| No | Current Status                                                        | Event                                                                                                             | Result                                                |
|----|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| 1  | Key Off                                                               | Unlock request by Remote Key or SMK<br>(If Mecha key is exist, add key unlock request)<br>Puddle Start Dimming Up | Puddle Start Dimming Up                               |
| 2  | Welcome Light Option On                                               | Welcome Light signal On event                                                                                     |                                                       |
| 3  | Puddle Dimming Down                                                   | Unlock request by Remote Key or SMK<br>(If Mecha key is exist, add key unlock request)                            |                                                       |
| 4  |                                                                       | Welcome Light Option On and Welcome Light signal On event                                                         |                                                       |
| 5  | Key Off, Key In<br>Any door unlock                                    | Finished Dim Up                                                                                                   | Puddle during On<br>14 sec                            |
| 6  | Key Off, Key In<br>Welcome Light Option On<br>Welcome Light signal On |                                                                                                                   |                                                       |
| 7  | Puddle during On                                                      | Unlock request by Remote Key or SMK<br>(If Mecha key is exist, add key unlock request)                            | Puddle during On<br>time increasing<br>additional 14s |
| 8  | Puddle On                                                             | Puddle On 14 sec expired                                                                                          |                                                       |
| 9  |                                                                       | ACC, IGN, ST                                                                                                      |                                                       |
| 10 |                                                                       | Lock request by Remote Key or SMK<br>(If Mech key is exist, add key lock request)                                 |                                                       |
| 11 | Puddle On                                                             | Welcome Light signal Off in Welcome Light Option On                                                               | Puddle Start<br>Dimming Down                          |
| 12 |                                                                       | All Door Lock event                                                                                               |                                                       |
| 13 |                                                                       | Into the ARM mode from DISARM mode                                                                                |                                                       |
| 14 |                                                                       | ACC, IGN, ST                                                                                                      |                                                       |
| 15 |                                                                       | Lock request by Remote Key or SMK<br>(If Mecha key is exist, add key lock request)                                |                                                       |
| 16 | Puddle Dimming Up                                                     | Welcome Light signal Off in Welcome Light Option On                                                               |                                                       |
| 17 |                                                                       | All Door Lock event                                                                                               |                                                       |
| 18 |                                                                       | Into the ARM mode from DISARM mode                                                                                |                                                       |
| 19 | Puddle Dimming Down                                                   | Finished Dim Down                                                                                                 | Puddle Off                                            |

# BCM (Body Control Module)

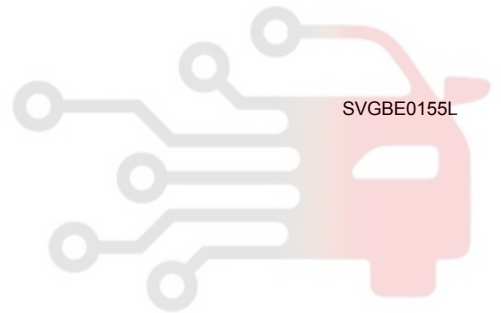
## BE-235

### [Puddle Lamp Control Diagrams]



Puddle Lamp is equipped under the outside mirrors and the type is Bulb.

When the vehicle is stop, Puddle Lamp operates by Remote Key, SMK Fob, Front Doors or Ignition status.





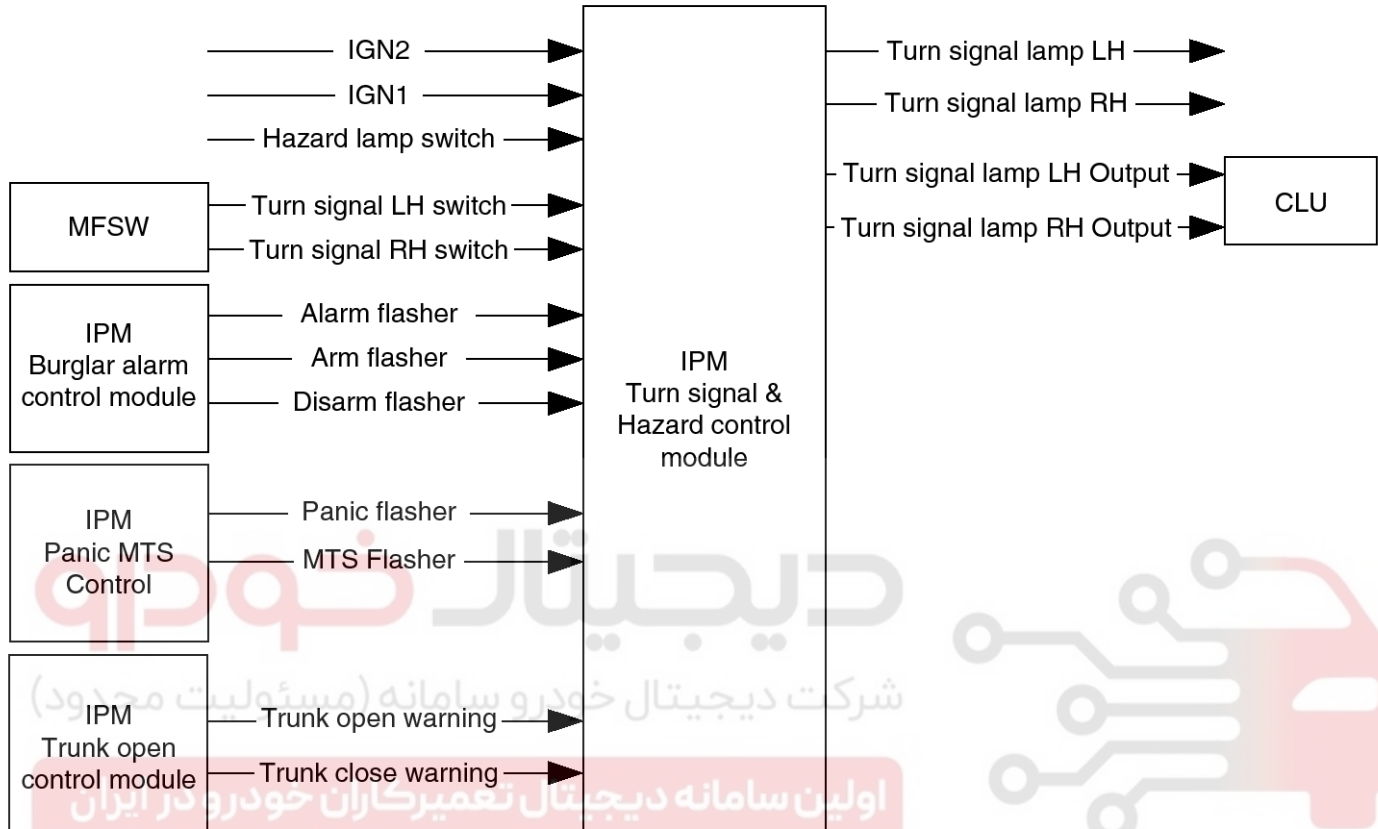
# BE-236

# Body Electrical System

## Turn and Hazard Control System

- Turn Left Signal Control
- Turn Right Signal Control
- Hazard Flashing Control

- Flashing Sound Control (Flasher Buzzer is in CLU. so CLU has turn and flashing sound control.)
- ALARM/ARM/DISARM Flashing Control
- Panic/MTS Flashing Control
- Trunk Open/Close Flashing Control



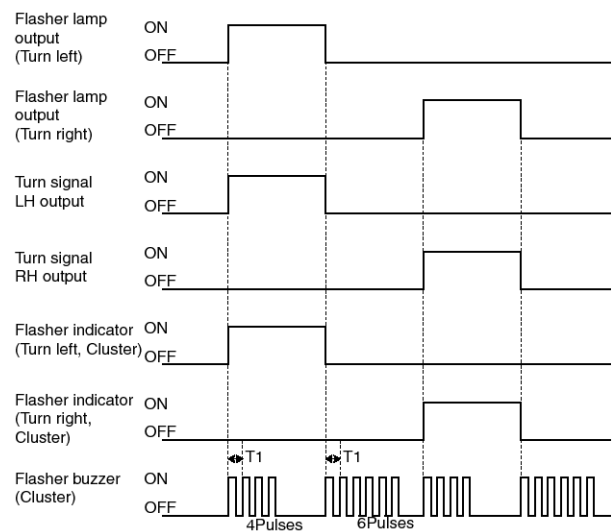
## Flasher Buzzer

To provide an audible feedback to the driver when flasher is active, a Flasher Buzzer is controlled.

While Flasher Lamp is operated, at the time of Output On/Off transition, the flasher buzzer is activated. Flasher Buzzer is controlled by the Cluster.

IPM turns on the turn left or/and turn Right flasher, cluster controls the flasher buzzer following the activation request from IPM.

- Flasher Lamp Output Off → On, Flasher Buzzer Output 4 pulses,
- Flasher Lamp Output On → Off, Flasher Buzzer Output 6 pulses
- Flasher Buzzer Outputs have the below pattern.



SVGBE0157L

T1:2[kHZ], 50% Duty

# BCM (Body Control Module)

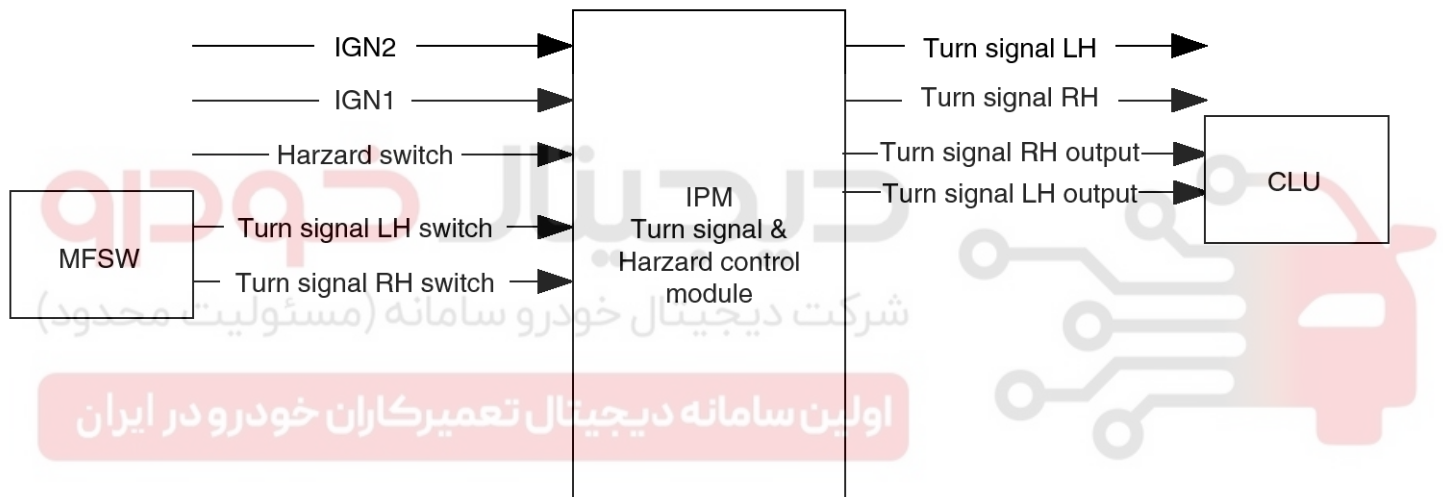
# BE-237

## Turn Signal and Hazard Control Function

1. Hazard Control
2. Turn Left / Right Control

3. One Touch Triple Turn Control
4. Fault Detect Control (Double Blinking)

| No | Pre-condition | Event                                    | Result                           |
|----|---------------|------------------------------------------|----------------------------------|
| 1  | IGN, Start    | Turn left switch On                      | Left flashing during switch on   |
| 2  | IGN, Start    | Turn right switch On                     | Right flashing during switch on  |
| 3  | IGN, Start    | Turn left switch On within less 1.5 sec  | Left triple turn flashing        |
| 4  | IGN, Start    | Turn right switch On within less 1.5 sec | Right triple turn flashing       |
| 5  | -             | Hazard switch On                         | Hazard flashing during switch on |
| 4  |               |                                          |                                  |



SVGBE0158L

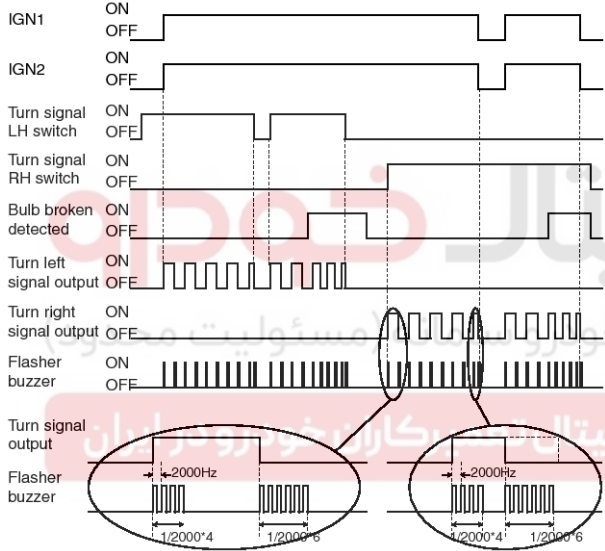
# BE-238

# Body Electrical System

- Turn Left/ Right Signal Flashing Function If the Left (or Right) turn switch is active and if IGN2 is On, the left (or Right) turn signal outputs are driven. The turn signal is active as long as both conditions ((Turn Sig LH SW or Turn Sig RH SW On) and IGN2 On) are true and is turned Off when one of these conditions is no longer detected.

If a failure is detected (Bulb/LED) outage or open load on the activated turn signal side, the flasher frequency is doubled. This failure can be detected when IGN1 and IGN2 On.

While Turn switch is On and failure was detected, even if bulb (or LED) failure is no longer detected, keep the double blinking flashing and after next Turn switch On transition, only then, flasher is activated with normal blinking.



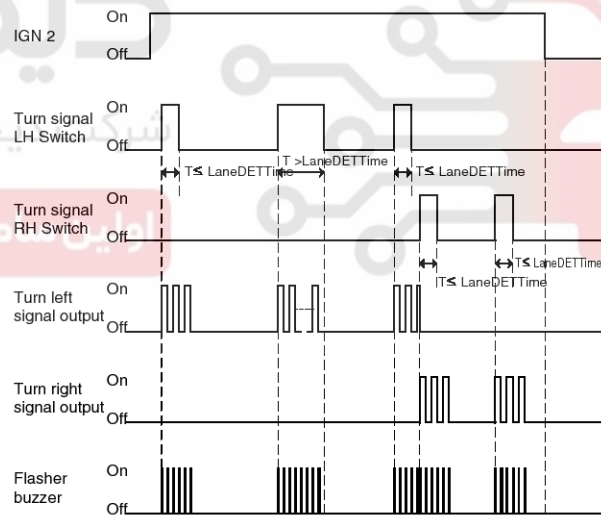
SVGBE0159L

- Left/ Right One Touch Triple Turn Signal Control Function

Flasher one touch triple turn signal feature means that a momentary activation of the turn switch will cause 3 flashes on the indicator circuit.

This one touch triple turn signal feature operates under the following conditions :

1. One touch triple turn signal mode enabled (Lane Enable On) by UMS [AT Turn N Value Set]
2. Ignition 2 shall be On, the one touch triple turn signal feature is not available if Ignition 2 is Off.
3. The turn switch input time and expected result is shown below.
4. During the One touch triple turn signal operation, if the user moves the turn switch in the other direction, then One touch triple turn signal mode is finished and the other direction's flashing (Normal or triple turn signal flashing) will start depending on the switch detection time.
5. The One touch triple turn signal Mode could be detected "bulb-fail" mode



SVGBE0161L

# BCM (Body Control Module)

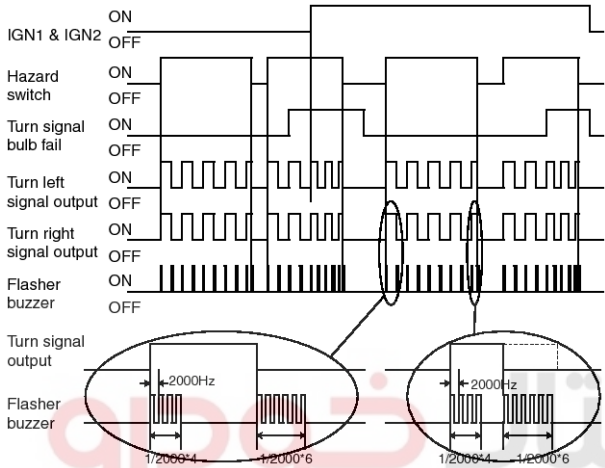
# BE-239

• Hazard Flashing Function

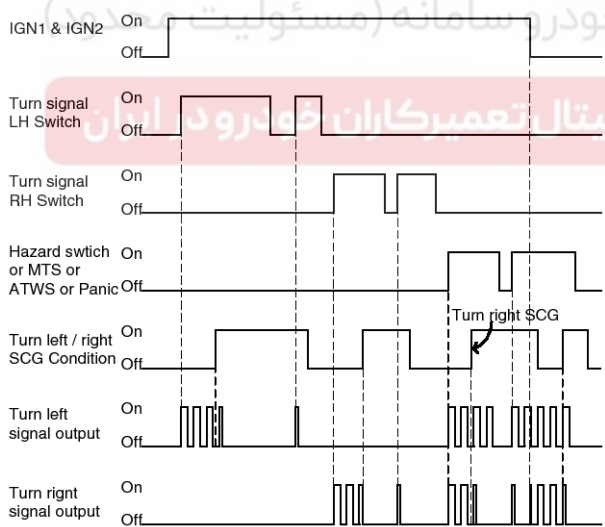
Activating the Hazard switch generates the Hazard signal, regardless of the Ignition key position. The Hazard signal is a permanent sequence. It goes off when the Hazard switch is deactivated.

The hazard drives both the Left and Right flashing sides.

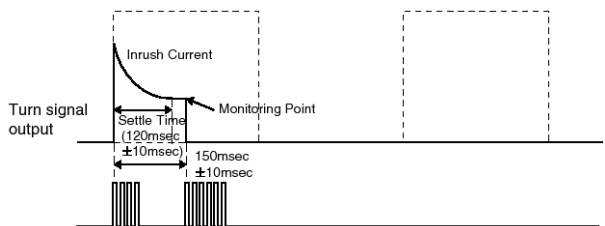
Like the Turn signal flashing, if Bulb (or LED) failure is detected, flashing frequency is doubled. But it is only possible in IGN1 and IGN2 On.



SVGBE0160L



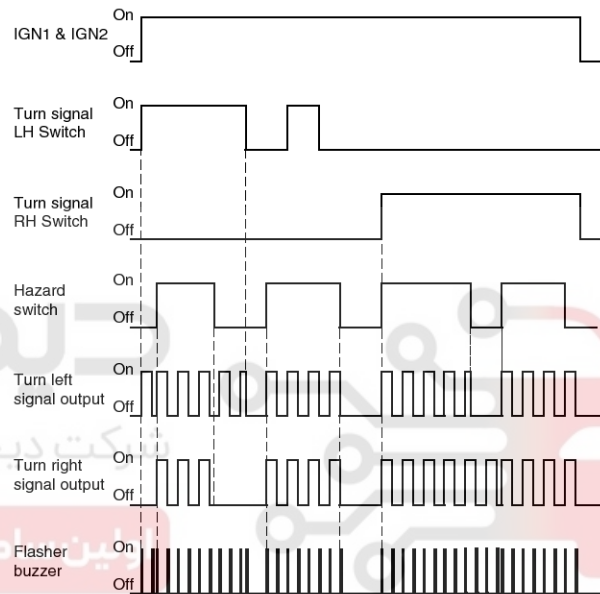
SVGBE0162L



SVGBE0163L

**NOTICE**

1. A short detection is possible only when the activation of the output is done. It is mandatory to retry the output activation each time when a new request occurs during SCG condition.
2. MCU should monitor the bulb (or LED) for fault detection after a settle time (120msec ± 10msec), time needed to avoid a measurement during inrush current phase, if SCG is detected after 150msec ± 10msec from the output activation, output is stopped.
3. When the circuit (line) is opened, corresponding CAN Data is kept On.



SVGBE0164L

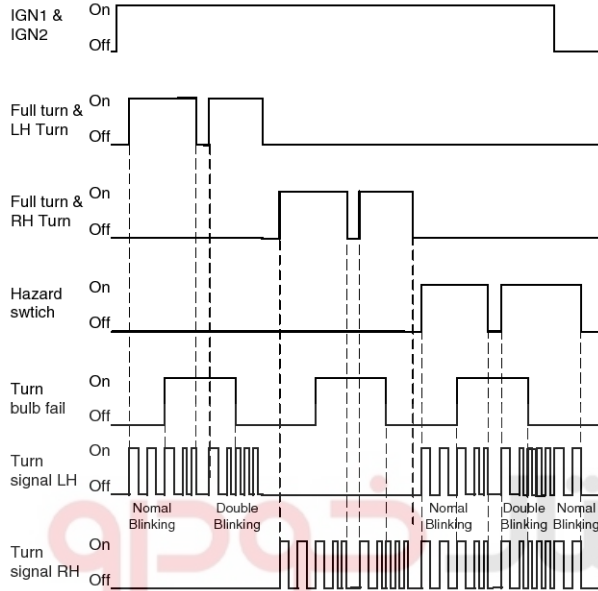
# BE-240

# Body Electrical System

• Double Blinking Detection Condition

In case of activation of turn & hazard the fault detection will be able to detect the failure only if 3 bulbs of Front or Rear are broken-down.

In case of turn signal activation when one of the Front or Rear is broken-down (Lamp failure), the turn signal blinks with double frequency.



SVGBE0165L

Lamp failure condition as below :

- Flasher fault detection should be inhibited according to Battery voltage, i.e.:

When the Vbat voltage is lower than FlasherFaultVoltageDetection (9V-Bulb case / 11V - LED case).

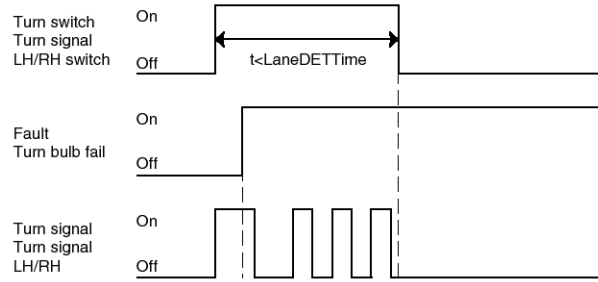
This threshold for flasher fault detection should be configured as a calibration variable (EEPROM variable)

- The fault detection is done while output for turn left/right or hazard is active and IGN1 On and IGN2 On, once fault is detected, IPM keep the fault mode until flasher triggering condition is released (Turn Right or Left switch off/ IGN2 or Hazard switch off)

- Fault detection in One touch triple turn signal mode

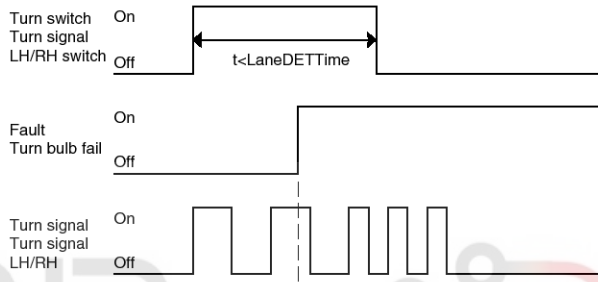
In Case of one touch triple turn signal flashing if detect the lamp fault, it output additional fault flashing (double blinking) 3 times.

1. If it detected the lamp fault during one touch triple turn signal's first flashing



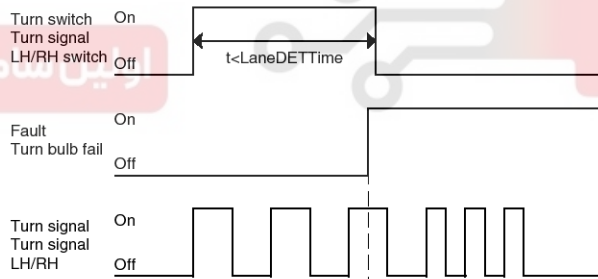
SVGBE0166L

2. If detect the lamp fault during one touch triple turn signal's second flashing



SVGBE0167L

3. If detect the lamp fault during one touch triple turn signal's third flashing



SVGBE0200L

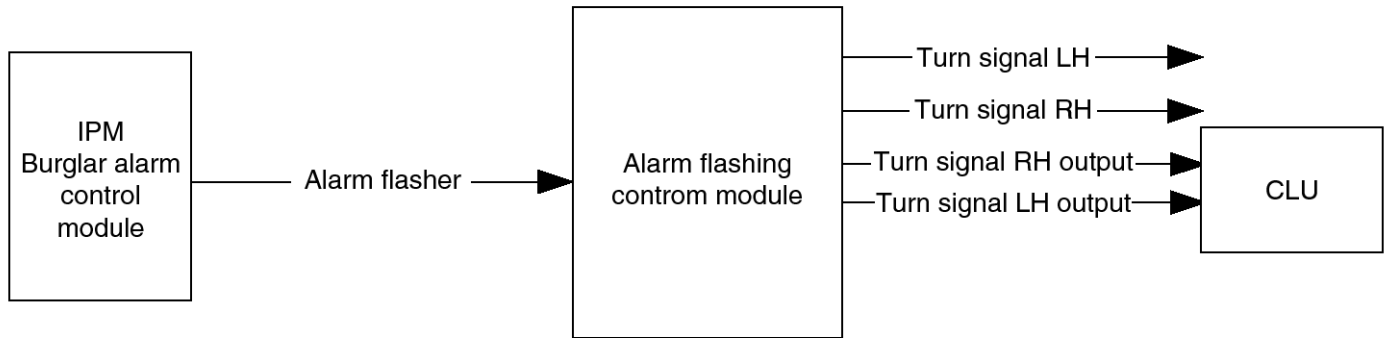
# BCM (Body Control Module)

# BE-241

## ALARM Flashing Control Function

- Management of request for Alarm flashing by Burglar Alarm manager

- Turn Left Control
- Turn Right Control



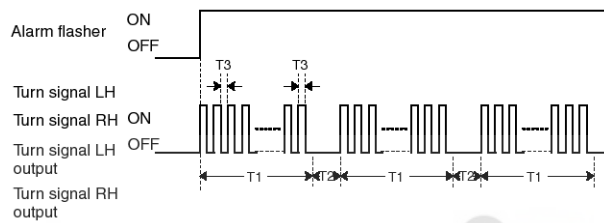
If there is a request for having the alarm flashing (Alarm Flasher On), a pattern of Turn left and turn right bulb flashing is performed.

When the request is no longer present (Alarm Flasher Off) the driving of the turn left and turn right bulbs flashing by Alarm is stopped without delay.

The flashing shall be synchronized with Horn Alarm activation.

Depending on the variant setting, flashing pattern consist in 1 or 3 group of flashing as described in below figure.

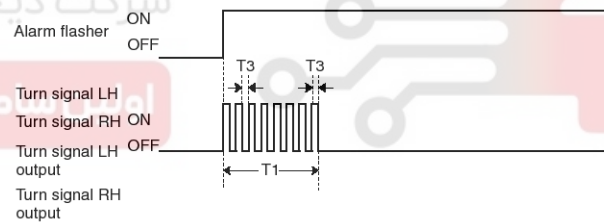
SVGBE0168L



SVGBE0169L

T1 : 27sec+0sec/-2.7sec, T2 : 10sec ± 1sec,

T3 : 450msce ± 45msec



SVGBE0170L

T1 : 27sec+0/-2.7sec, T3 : 450msce ± 45msec

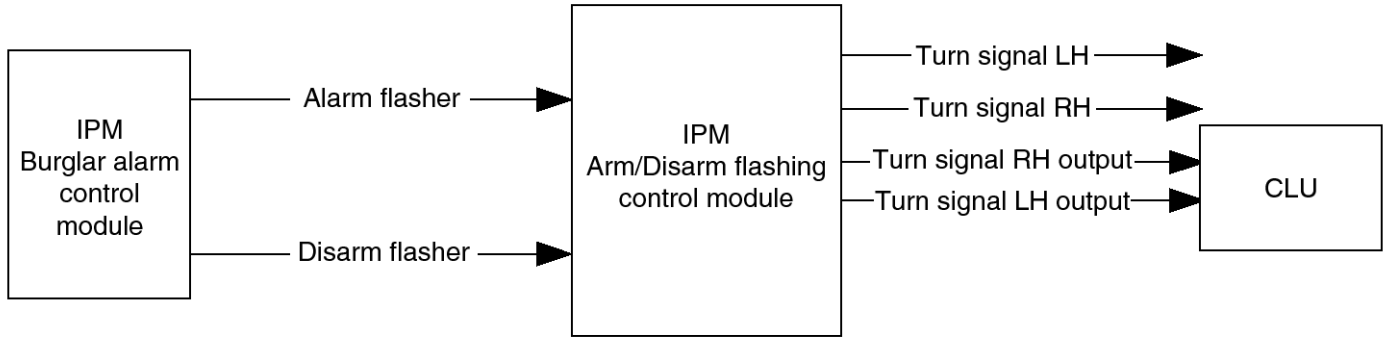
# BE-242

# Body Electrical System

## ARM / DISARM Flashing Control Function

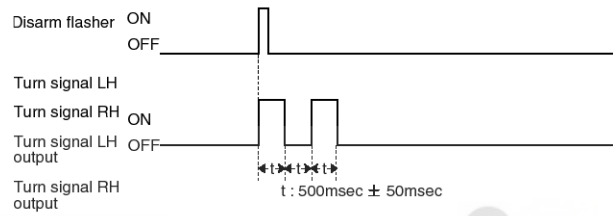
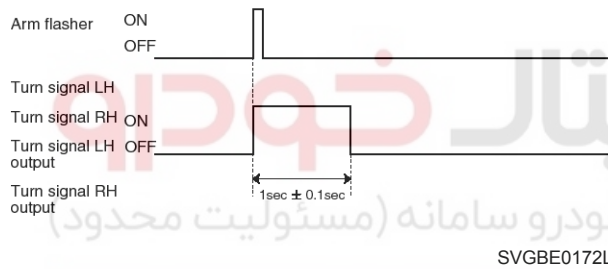
- Management of request for Arm/Disarm flashing by Burglar Alarm manager

- Turn Left Control
- Turn Right Control



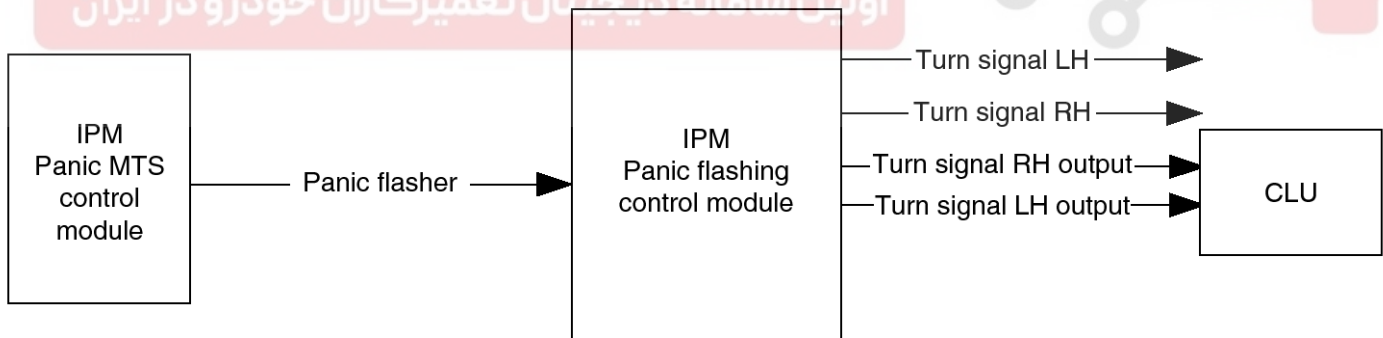
SVGBE0171L

If there is a request for having the arm flashing (Arm Flasher Off → On) or disarm flashing (Disarm Flasher Off → On), a pattern of Turn left and turn right bulb flashing is performed.



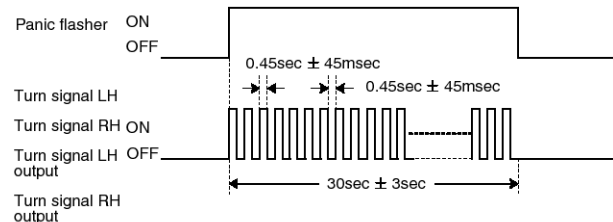
## Panic Flashing Control Function

- Management of request for flashing by Panic function
- Turn Left Control
- Turn Right Control



SVGBE0174L

1. If there is a request for having the Panic flashing (Panic Flasher On), a pattern of Turn left and turn right bulb flashing is performed.
2. When the request is no longer present (Panic Flasher Off) the driving of the turn left and turn right bulbs flashing by Panic is stopped without delay.
3. The flashing shall be synchronized with Horn activation



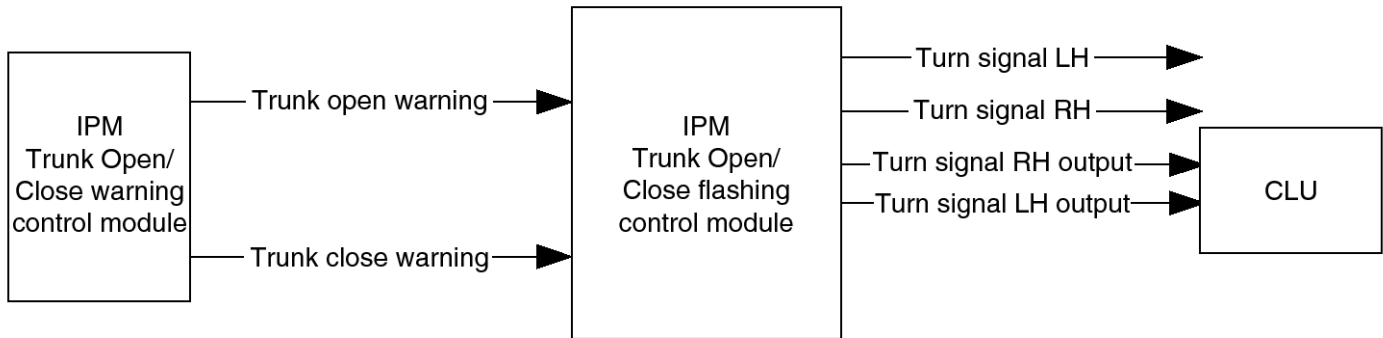


# BCM (Body Control Module)

# BE-243

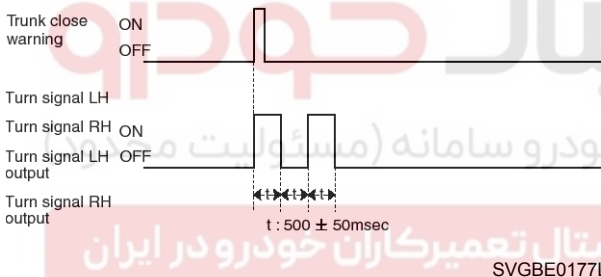
## Trunk Open / Close Flashing Control Function

- Management of request for Trunk Open flashing/Trunk Close flashing by TrunkOpen manager
- Turn Left Control
- Turn Right Control

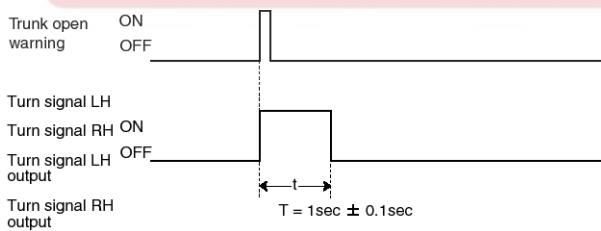


SVGBE0176L

1. If there is a request for having the trunk open or close flashing (Trunk Open Warning Off→On || Trunk Close Warning Off→ On), a pattern of Turn left and turn right bulb flashing is performed.



SVGBE0177L



SVGBE0201L

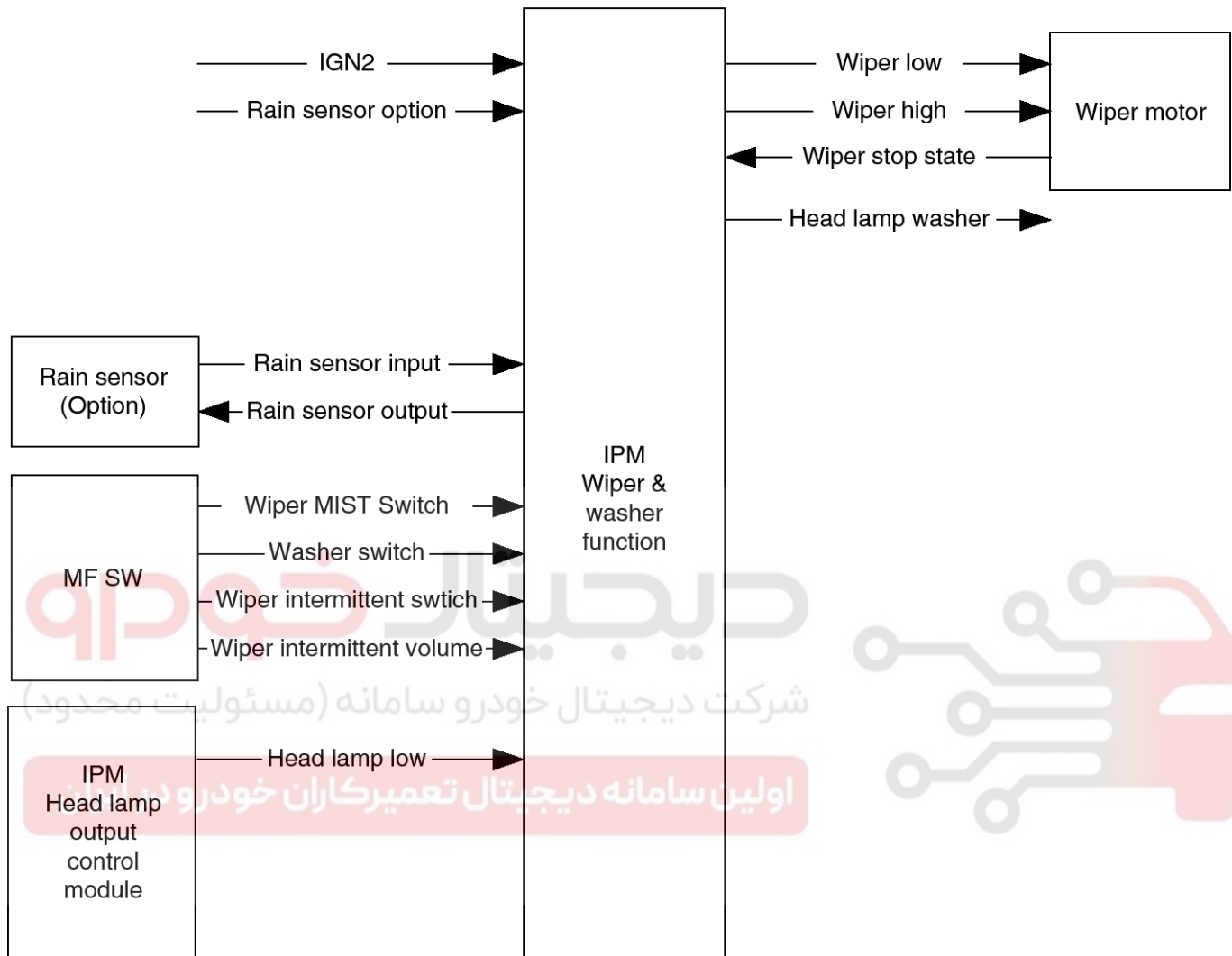


# BE-244

# Body Electrical System

## Wiper & Washer

- Front Wiper Control
- Head Lamp Washer Control



SVGBE0178L

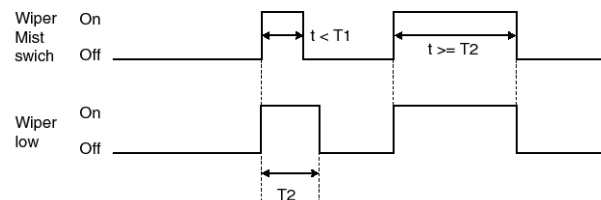
This function has the following features

- Wiper Mist Mode control
- Wiper Intermittent Control
- Washer related Wiper Control
- Wiper Control by Rain Sensor request

### 1. Front Wiper Mist Control

In case of IGN2 On, if turn on the Wiper Mist Switch, then Wiper is controlled, by switch on time.

Mist operation does not work at Wiper Washer.



SVGBE0179L

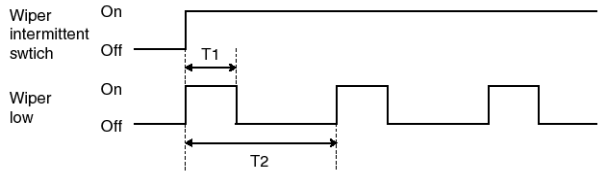
T1 : One wiping, T2 : Mist one time

# BCM (Body Control Module)

# BE-245

## 2. Front Wiper Intermittent Control

In case of IGN2 On and no Auto Option, if turn on the Wiper Intermittent Switch, then Wiper Low output is turned on depending on Wiper Intermittent Time(WiperIntmtTime, this value is defined by WiperIntmtVol input value).



SVGBE0180L

T1 : One wiping, T2 : Wiper intermittent time

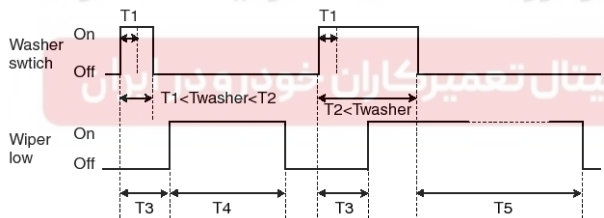
## 3. Front Wiper Washer Control

In case of IGN2 On, if user turns on the Washer Switch more than a given time, then Wiper output shall be driven depending on Wiper mode.

### NOTICE

During Wiper High output by Rain sensor, if Washer SW is detected, in spite of Low Speed control, High Speed output is controlled with same time values.

In Rain sensor Option, during washer operation, it should output washer PWM duty Value to rain sensor.



SVGBE0181L

T1 : Washer switch DET Time, T2 : Mist mode time

T3 : Output delay time, T4 : One wiping,

T5 : Washer mode time

## 4. Front Wiper Auto Control by Rain Sensor

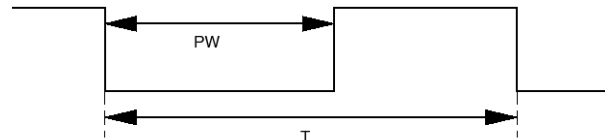
In case of IGN2 On and Auto Option, if user turns on the Wiper Auto Switch, then Wiper Low output and Wiper High output are controlled depending on Rain Sensor Request.

## 1) Rain Sensor Automatic Mode

When the wiper switch is moved to AUTO position and the Ignition switch is in IGN2 position, the Rain sensor is considered to be in "AUTOMATIC" mode

## 2) IPM Output Signal(IPM To Rain Sensor)

The IPM sends to the rain sensor a pulse width modulated waveform(P\_RainSnsrOutput). The total period of the waveform is 10 milliseconds ( $\pm 1\text{msec}$ ).

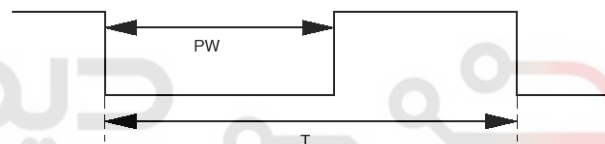


SVGBE0182L

PW is measured at the sensor input pin.

$T=10 \pm 1\text{ms}$

## 3) IPM Input Signal(Rain Sensor To IPM)



SVGBE0183L

PW is measured at the sensor input pin.

$T=17.5 \pm 1\text{ms}$

## 4) Fault strategy for the wiper park sense input

Here is the fault strategy for the wiper park sense input (wiper locked).

A fault is raised when as the wiper park sense input (Wiper Stop State) is stuck to ground longer than  $2 \pm 0.2\text{s}$  since the relay was activated to make a wipe.

This failure indicates that there's a short circuit between Wiper Stop State input and the ground.

Another fault is raised when as the wiper park sense input (Wiper Stop State) is stuck to battery longer than  $2 \pm 0.2\text{s}$  since the relay was activated to make a wipe.

This failure indicates that there's a short circuit between Wiper Stop State input and the battery line.

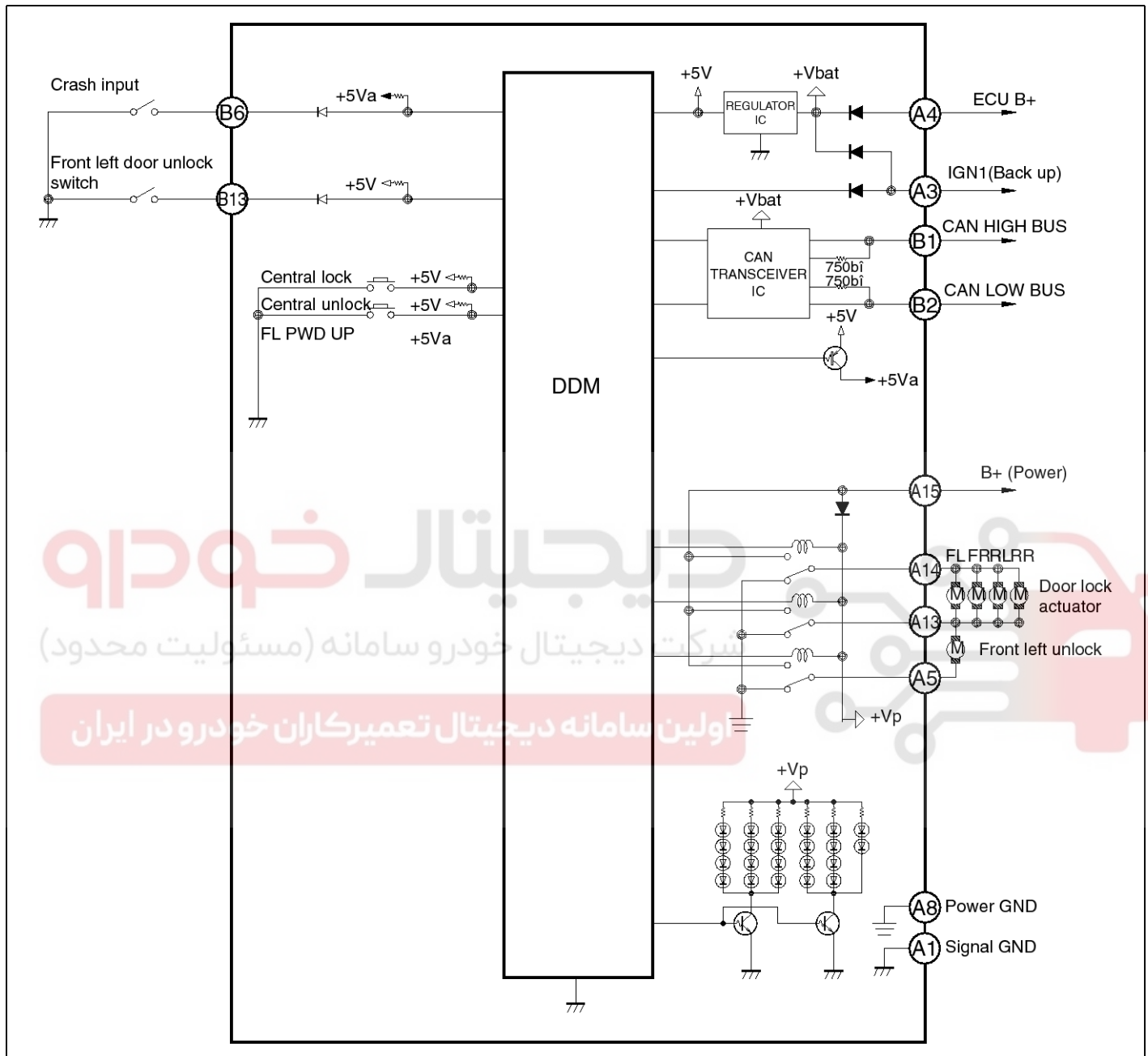
# BE-246

# Body Electrical System

## Door Lock/Unlock Function

- Door Lock/Unlock by Central Lock
- Door Unlock by Crash Unlock Request

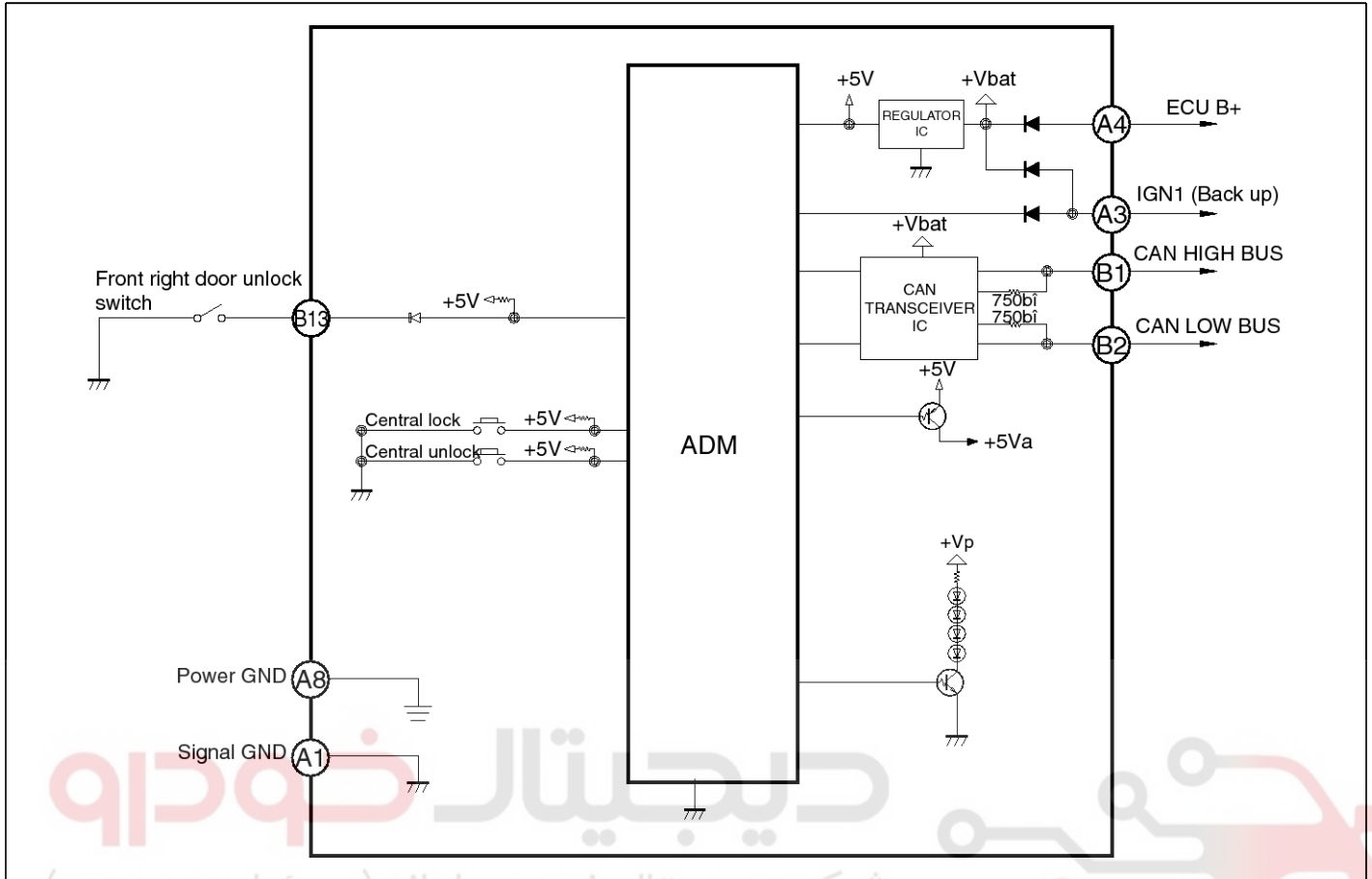
- Door Lock/Unlock by Auto Door Lock Function
- Door Unlock by Key-Reminder Function



SVGBE0184L

# BCM (Body Control Module)

# BE-247



شرکت دیجیتال خودرو (مسئولیت محدود)

SVGBE0185L

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

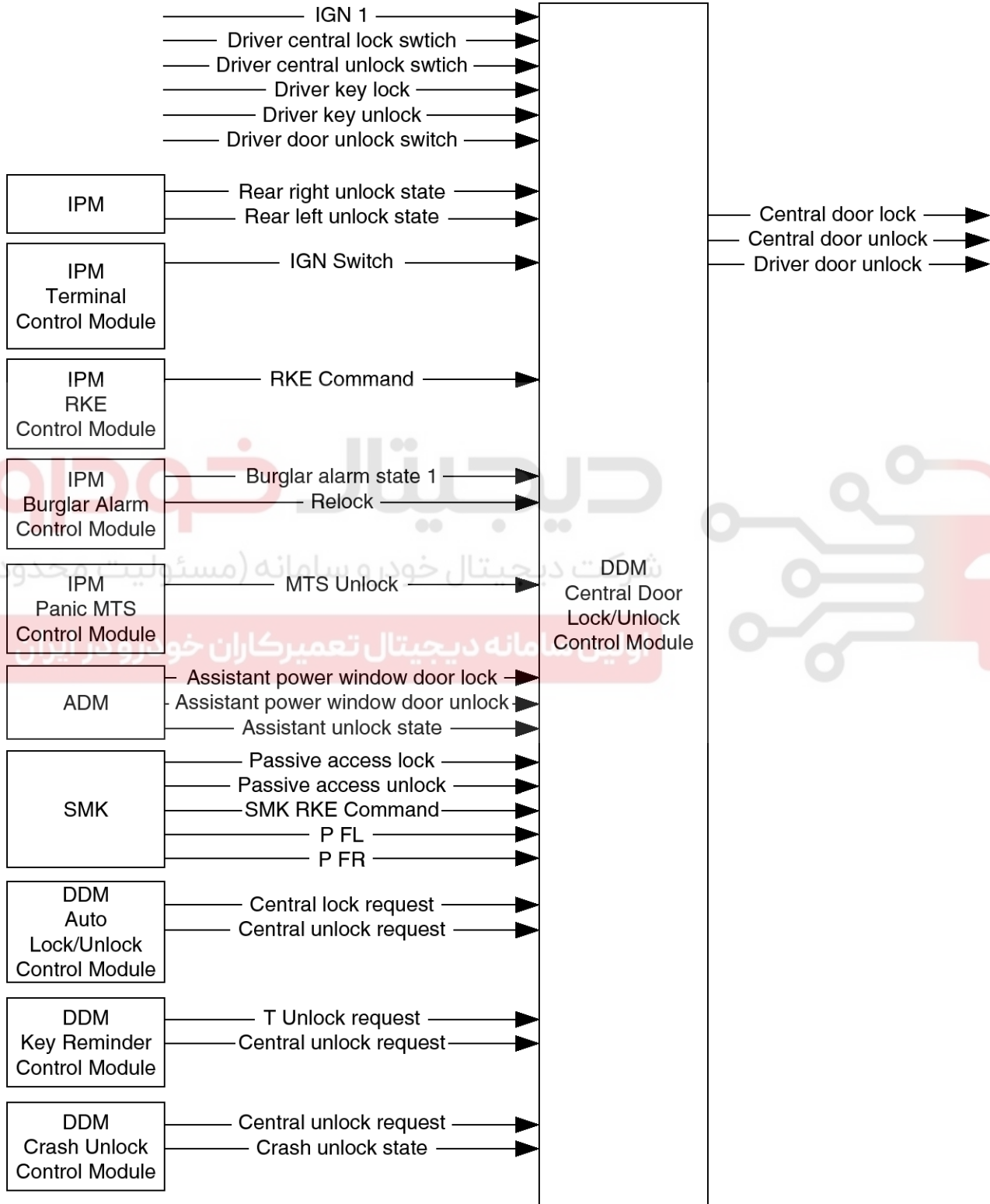
# BE-248

# Body Electrical System

## Central Door Lock/Unlock Function

- Doors Lock/Unlock by Central Lock/Unlock Switch
- Doors Lock/Unlock by Mechanical Key (Door Key)
- Doors Lock/Unlock by RKE

- Doors Lock/Unlock by SMK
- Doors Lock by Burglar Alarm Function
- Doors Unlock by Two Turn Unlock Function



SVGBE0186L

# BCM (Body Control Module)

# BE-249

## 1. Central Lock/Unlock Operation Condition

If the central locking/unlocking request is detected, central locking function is operated and outputs all doors lock/unlock during Lock Out Time/ Unlock Output Time. (Generally this value is 500msec).

And then, it have delay time for next Lock/Unlock Operation for Off Delay Time (Generally this value is 100msec).

However Central lock shall be inhibited while crash unlock is active

| Request                    | Central Lock                                                     | Central Unlock                                                            |
|----------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------|
| Central lock/unlock switch | In crash unlock not active state                                 | Burglar alarm state1 Off (DISARM, AutoLockTimer1, AutoLockTimer2, PREARM) |
| Mechanical key lock/unlock | 1. Terminal off (Key off)<br>2. In crash Unlock not active state | All                                                                       |
| RKE lock/unlock            | In crash unlock not active state                                 | All                                                                       |
| Passive lock/unlock        | In crash unlock not active state                                 | All                                                                       |

## 2. Lock/Unlock Operation Condition

### 1) Lock/Unlock Request by Central Lock/Unlock Switch

Central locking shall be inhibited in following condition

- Central lock inhibit condition: When crash unlock is active
- Central unlock inhibit condition: Burglar alarm State1 is on (ARMWAIT, ARM, ALARM, REARM, ARMHOLD).

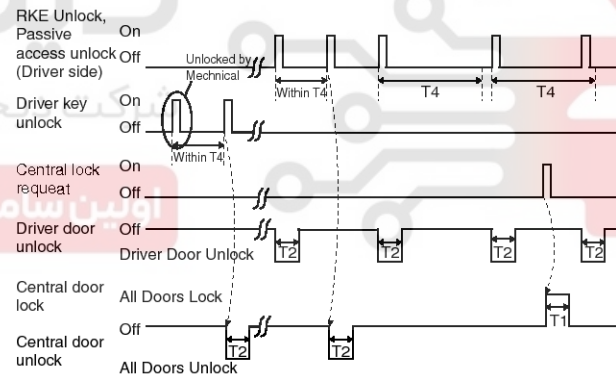
### 2) Lock/Unlock Request by Mechanical Key

For making central Lock or Unlock by mechanical key, if the mechanical key lock/unlock is requested firstly, check the each knob's state and then central Lock/Unlock operate. If knob state is not requesting state over the "M Lock Time" (when requests Lock; 3 sec) or "M Unlock Time"(when requests unlock; 3 sec), central Lock/Unlock function is not done.

Mechanical key is applicable to driver side door only.

## 3) Lock/Unlock Request by RKE or SMK

Central Lock/Unlock Operation is possible by RKE or SMK. Basically this signal is made at Key Out state (IGN SW !=Key In & IGN SW !=ACC & IGNSW !=IGN). So Central Locking function is operated Lock/Unlock at received from RKE or SMK.



SVGBE0187L

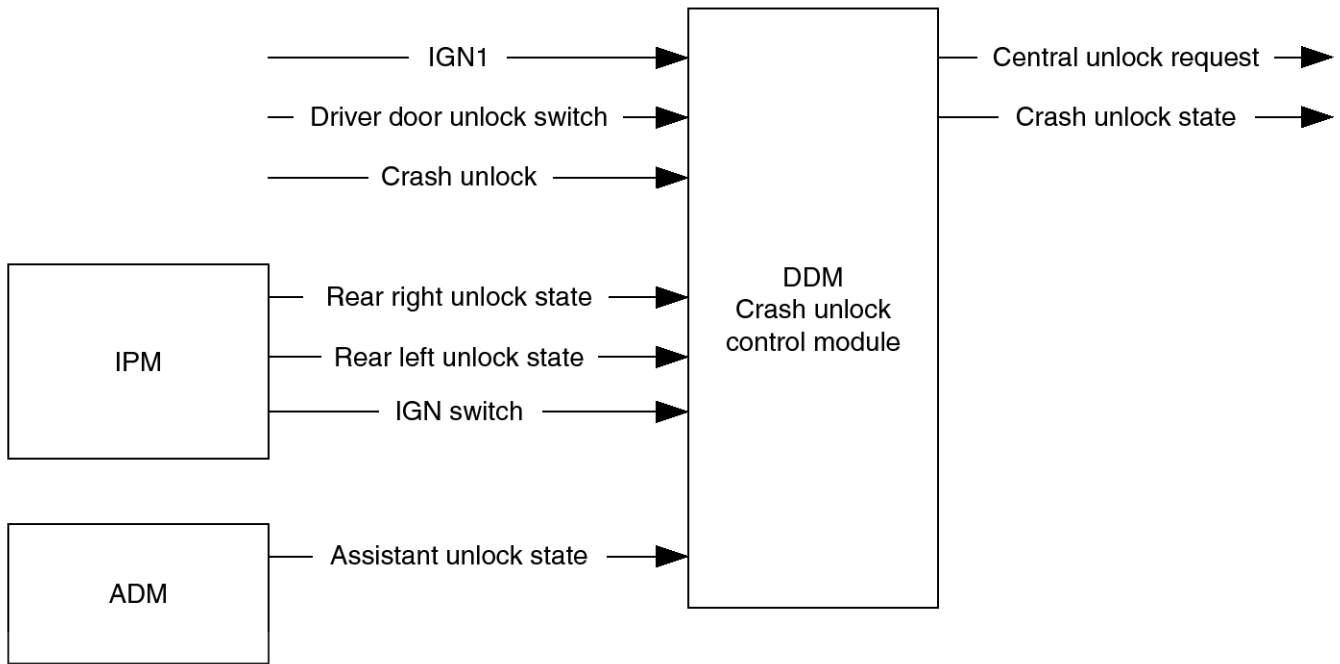
T1: Central time, T2: Central unlock time, T4: Two turn time



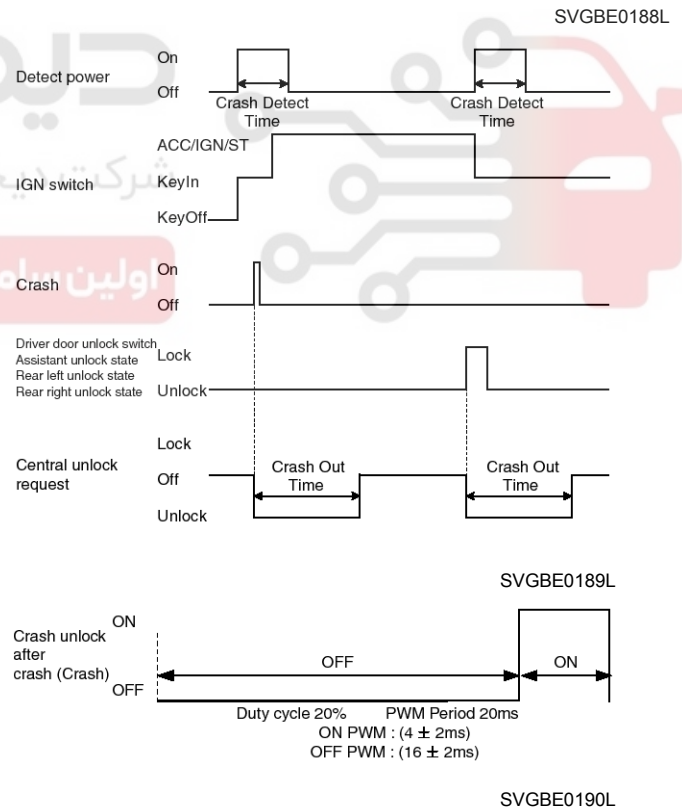
# BE-250

# Body Electrical System

## Crash Unlock Function



1. This function is to make unlock status in emergency case.
2. If the crash is occurred (Crash On, when Crash Unlock signal is changed to crash status), output all doors unlock during "Crash Unlock Time".
3. After crash unlocking, If safety knob state is changed unlock to lock, all doors are unlocked, again.
4. After crash is activated, Central Lock and Auto Door Lock Function can not operate until Key off and after expiring of Crash Detect Time since Key off to Key In or Terminal state going to Off with Key inserted.



# BCM (Body Control Module)

## BE-251

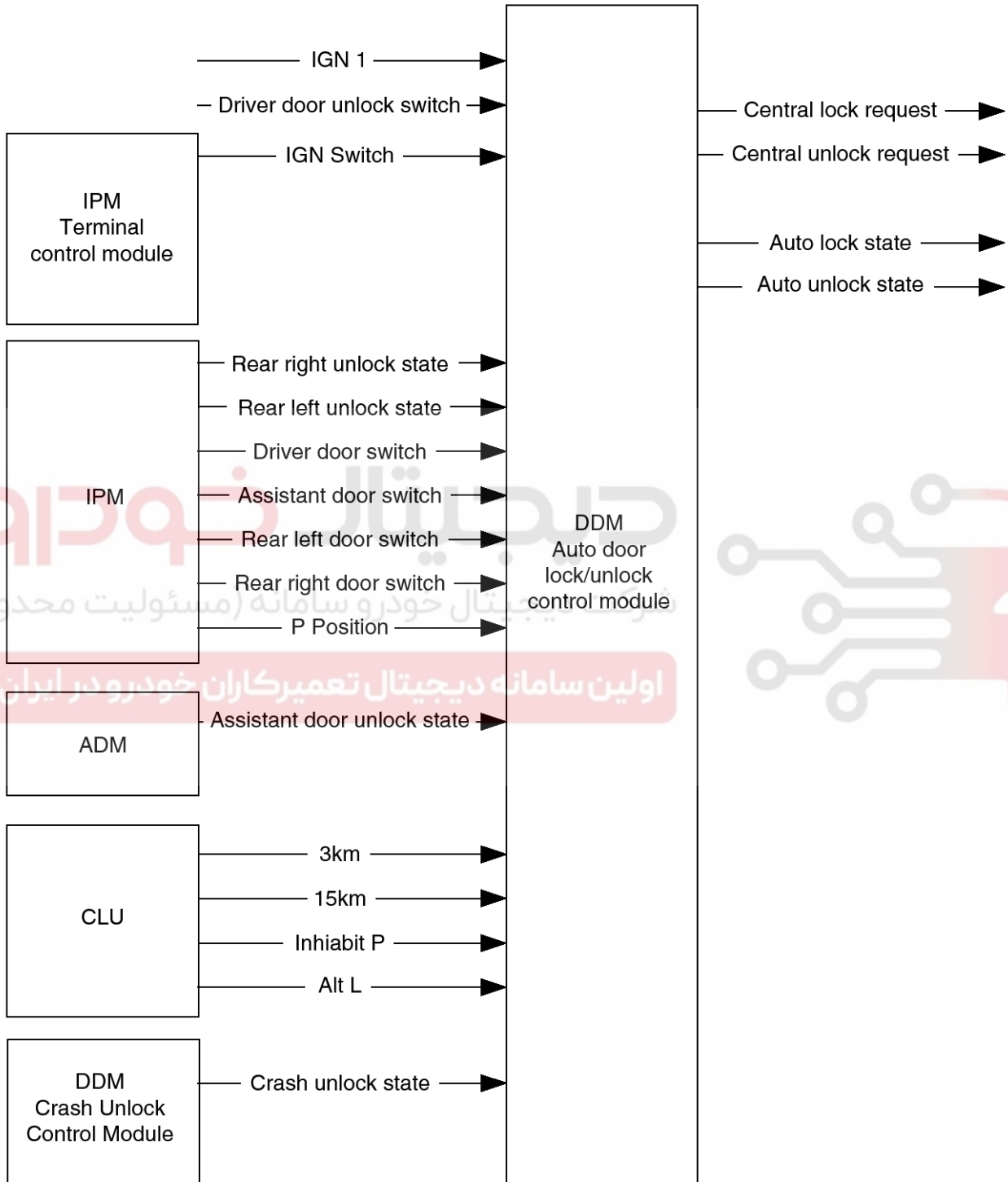
### Auto Door Lock/Unlock Function

#### 1. Auto Door Lock

- 1) Door Lock by Shift-Lever
- 2) Door Lock by Vehicle Speed

#### 2. Auto Door Unlock

- 1) Door Unlock by Shift-Lever
- 2) Door Unlock by Driver Safety Knob state
- 3) Door Unlock by Key Off



SVGBE0191L

# BE-252

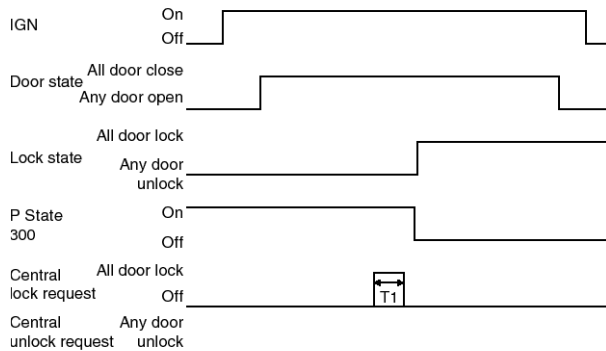
# Body Electrical System

During driving, it makes lock state and after finish driving, makes unlock state, automatically.

## 1. Auto Door Lock

### 1) Shift - Lever Option

During ignition on (IGN State On), and when all doors are closed and any door is unlocked, if the shift lever position is change P position to other position, all doors are locked.



SVGBE0192L

T1 : Central lock time

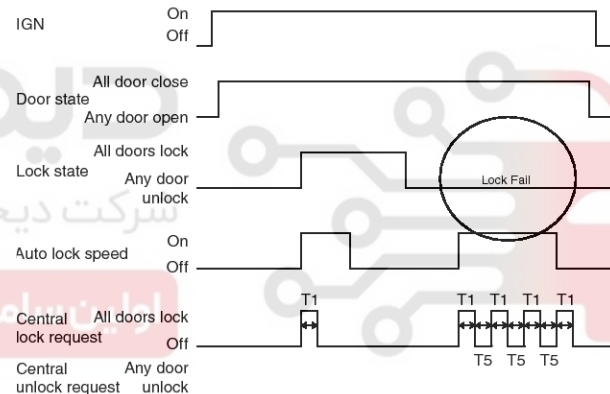
### 2) Vehicle Speed Option

<<Vehicle Speed Auto Lock Condition >>

1. During ignition on (IGN State On), and when any door is unlocked, if vehicle speed is exceeded the "Auto Door Lock Speed" Km/h, output all doors lock.
2. After output all doors lock, if any door is not locked, output all doors lock "Auto Relock Number" times.
3. Between each lock output, it have "Auto Lock Delay Time" time gap.
4. During "Auto Relock Number" times all doors lock output, if all doors state are changed lock, stop this output.
5. During vehicle speed is over "Auto Door Lock Speed" Km/h, if any door is unlocked, output all doors lock, again.
6. However after "Auto Relock Number" times all doors lock output, even if any door is unlocked, before ignition off(IGN State Off) or all doors is changed to lock, there is no additional lock output.

<<Vehicle Speed Auto Lock State Release Condition>>

1. After auto lock, it does not operate again. But in below condition, auto lock state is release and if it meets the Auto Lock condition, auto lock operates again.
2. Any Knob state is changed to unlock (So, when vehicle speed is exceeded the "Auto Door Lock Speed" Km/h, any knob state change to unlock, auto lock function is operate, again.)
3. After Crash Unlock output (But, in Crash active state, Auto lock does not operate.)
4. Ignition off (IGN State Off)
5. Vehicle Speed is below "Auto Door Lock Speed" Km/h, (So, if vehicle speed is exceeded the "Auto Door Lock Speed" Km/h and any knob states are unlock, auto lock function is operate, again)



SVGBE0193L

T1 : Central time, T5 : Auto lock delay time

<< Knob Lock Fail Condition >>

1. After "Auto Relock Number" times all doors lock output, failed Knob is enter the knob Fail mode.
2. So, when meet vehicle speed Auto Locking condition again, that time it does not consider the previously failed knob.(Auto Lock 3 times not operate.), However, another knob have a fail, operate Auto Lock 3 times.
3. This failed knob state is release in below condition.
4. The failed knob is changed unlock to lock.
5. Ignition off (IGN State Off)

# BCM (Body Control Module)

# BE-253

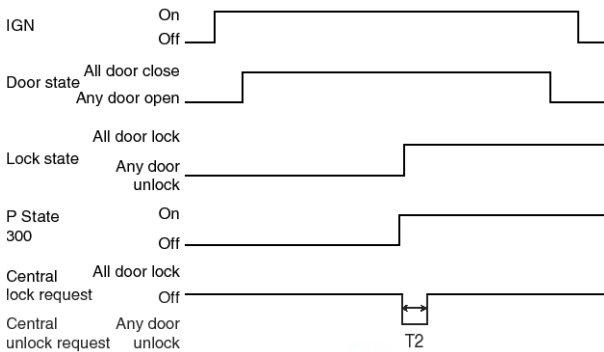
## 2. Auto Door Unlock

### 1) Shift - Lever Option

During ignition on (IGN State On), and when all doors are closed and any door is locked, if the shift lever position is change other position to P position, all doors are unlocked.

Change of shift lever state has the confirm time (300msec).

If shift lever state change 'On' □ 'OFF' □ 'On' within 300msec, [P State 300 On] is kept.

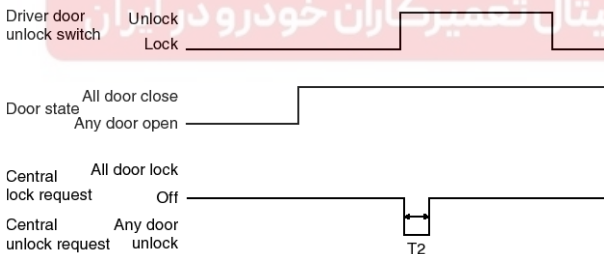


SVGBE0194L

T2 : Central unlock time

### 2) Driver Safety Knob Unlock Option

When all doors are closed, if the driver door safety knob is changed lock to unlock, during Auto lock is not activated.

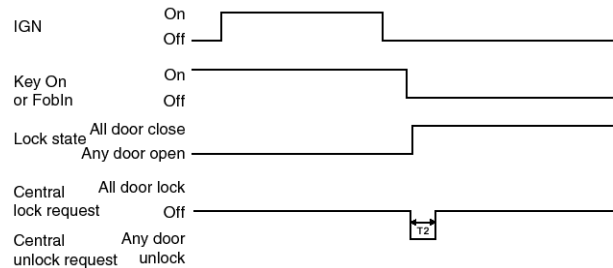


SVGBE0195L

T2 : Central unlock time

## 3) Key Off Option

When Ignition key (or Fob) switch status is not off, if Ignition key (or Fob) switch status is changed off, any door is locked.



SVGBE0196L

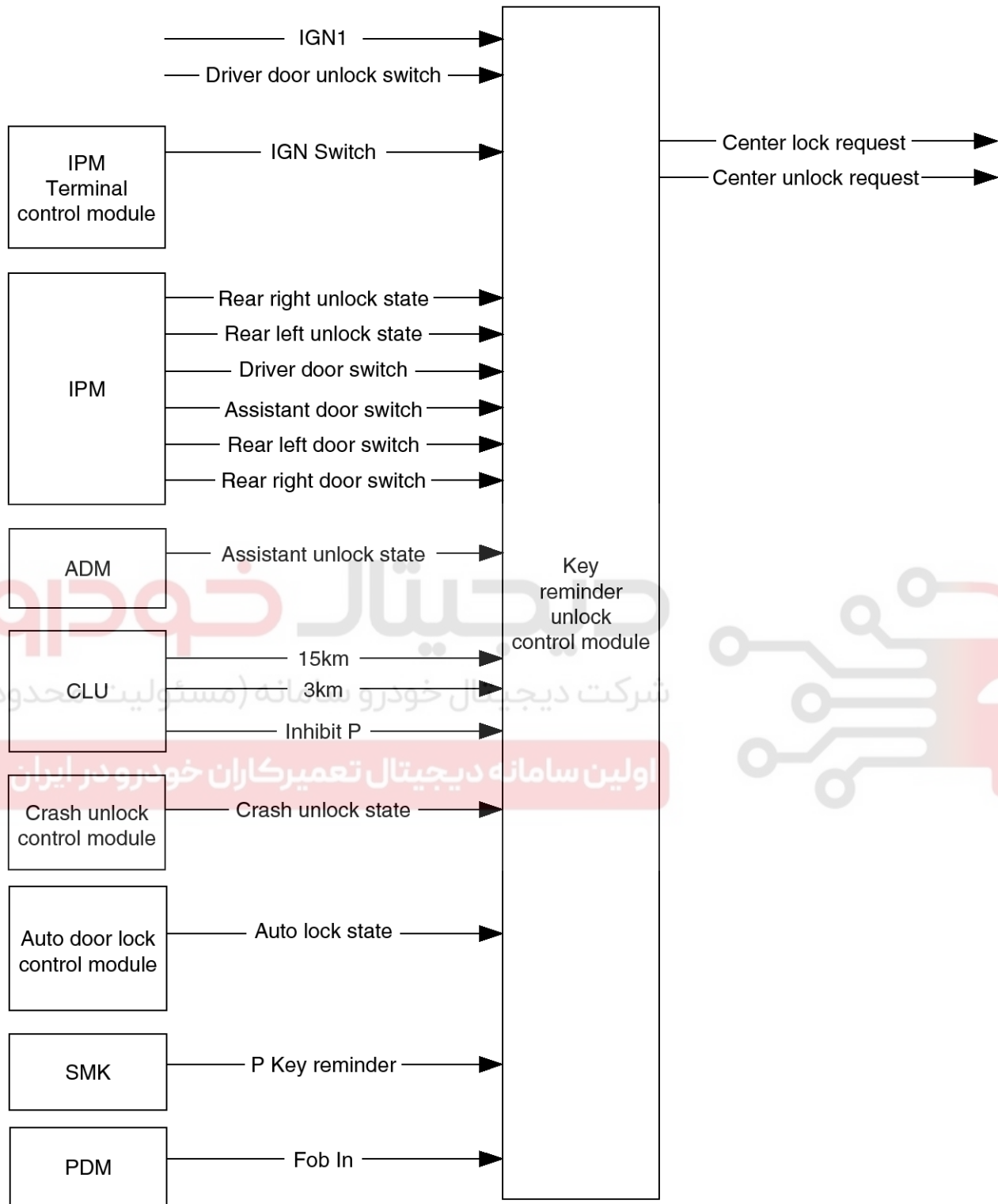
T2 : Central unlock time



# BE-254

# Body Electrical System

## Key Reminder Unlock Function



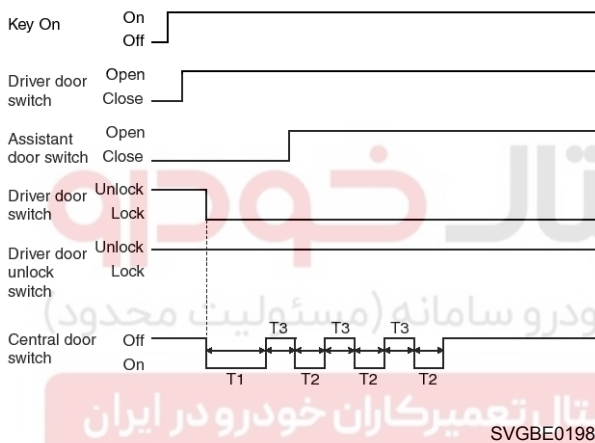
SVGBE0197L

# BCM (Body Control Module)

## BE-255

### 1. Key Reminder Unlock

- 1) After output door Unlock, if Driver or Assistant door is not unlocked, outputs unlock "Key Reunlock Number" times.
- 2) Between each unlock output, it have "Key Reunlock Delay Time" time gap.
- 3) During "Key Reunlock Number" times door unlock output, if door state is changed to unlock, stop this output.
- 4) However after "Key Reunlock Number" times door unlock output, even if door is unlocked, before Key out or door is changed to unlock, there is no additional unlock output.
- 5) If vehicle speed is exceed 3km/h, or active auto door lock, does not work the key Reminder function



T1 : Key reminder first unlock time

T2 : Key reminder unlock time

T3 : Key reminder unlock delay time

### 2. Knob Unlock Fail

- 1) After "Key Reunlock Number" times all doors Unlock output, failed knob is enter the Knob Fail mode.
- 2) So, when meet key Reminder Unlock condition again, that time it does not consider the previously failed knob.(Key Reminder Unlock 3 times not operate.), However, another knob have a fail, operate Auto Lock 3 times.
- 3) This failed knob state is release in below condition.
  - The Failed Knob is changed Unlock to Lock or Lock to Unlock.
  - Ignition off (Key Off → On)
  - Failed Knob side Door is opened.

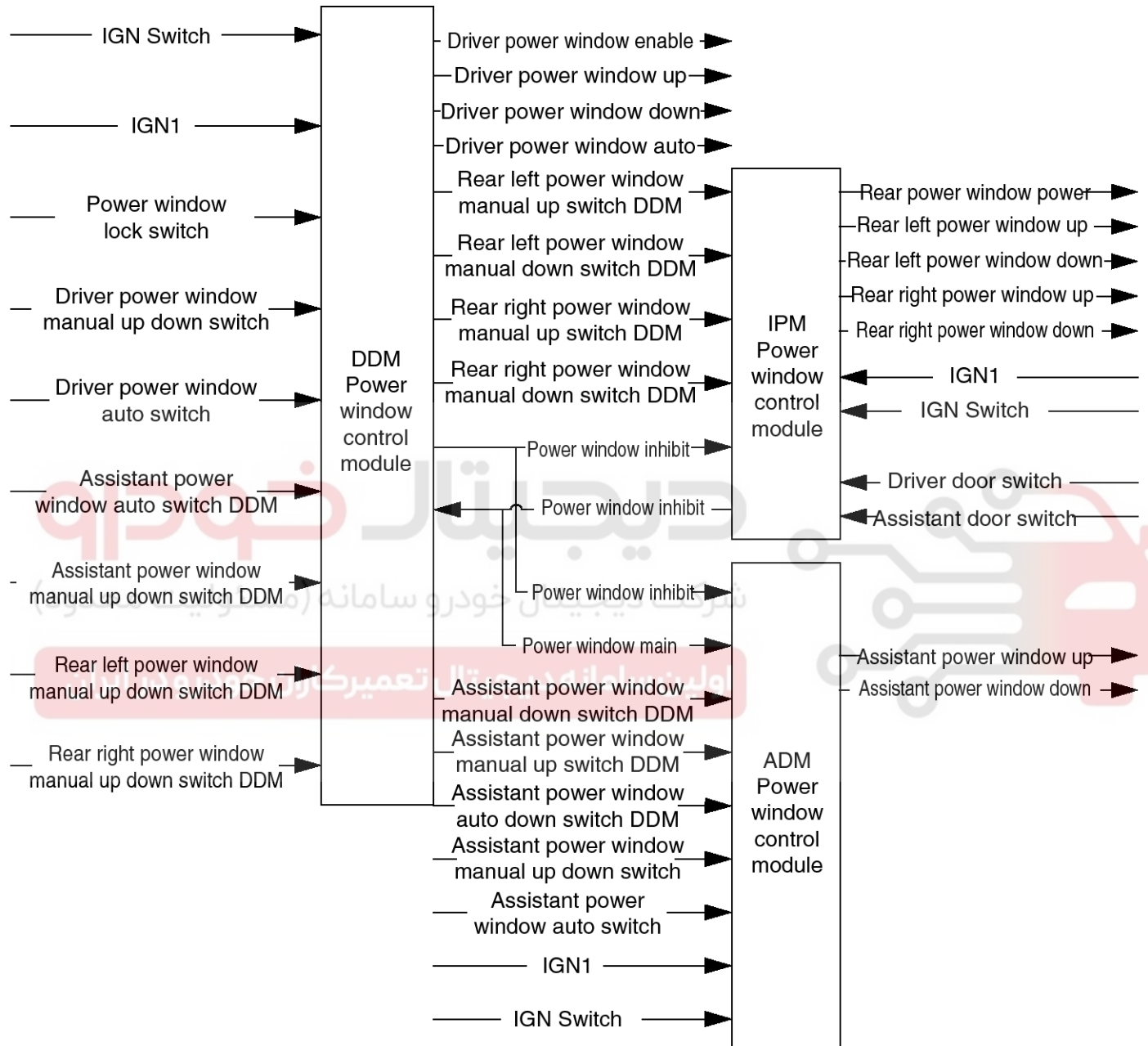


# BE-256

# Body Electrical System

## The Power Window Control System

- Power Window Main Timer Control
- Front Power Window Control (Auto/Manual Mode)
- Rear Power Window Control (Manual Mode)

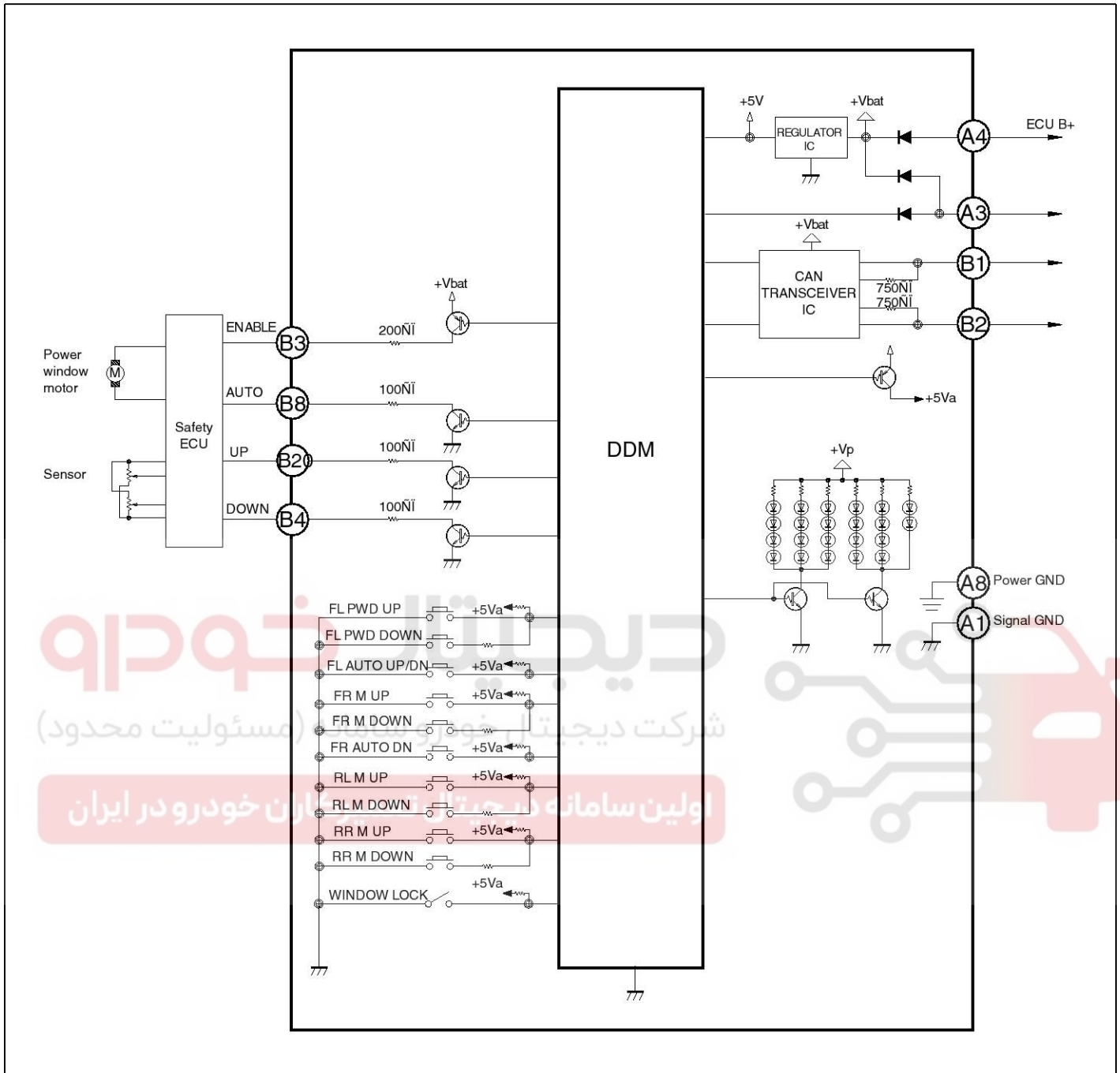


SVGBE0202L



# BCM (Body Control Module)

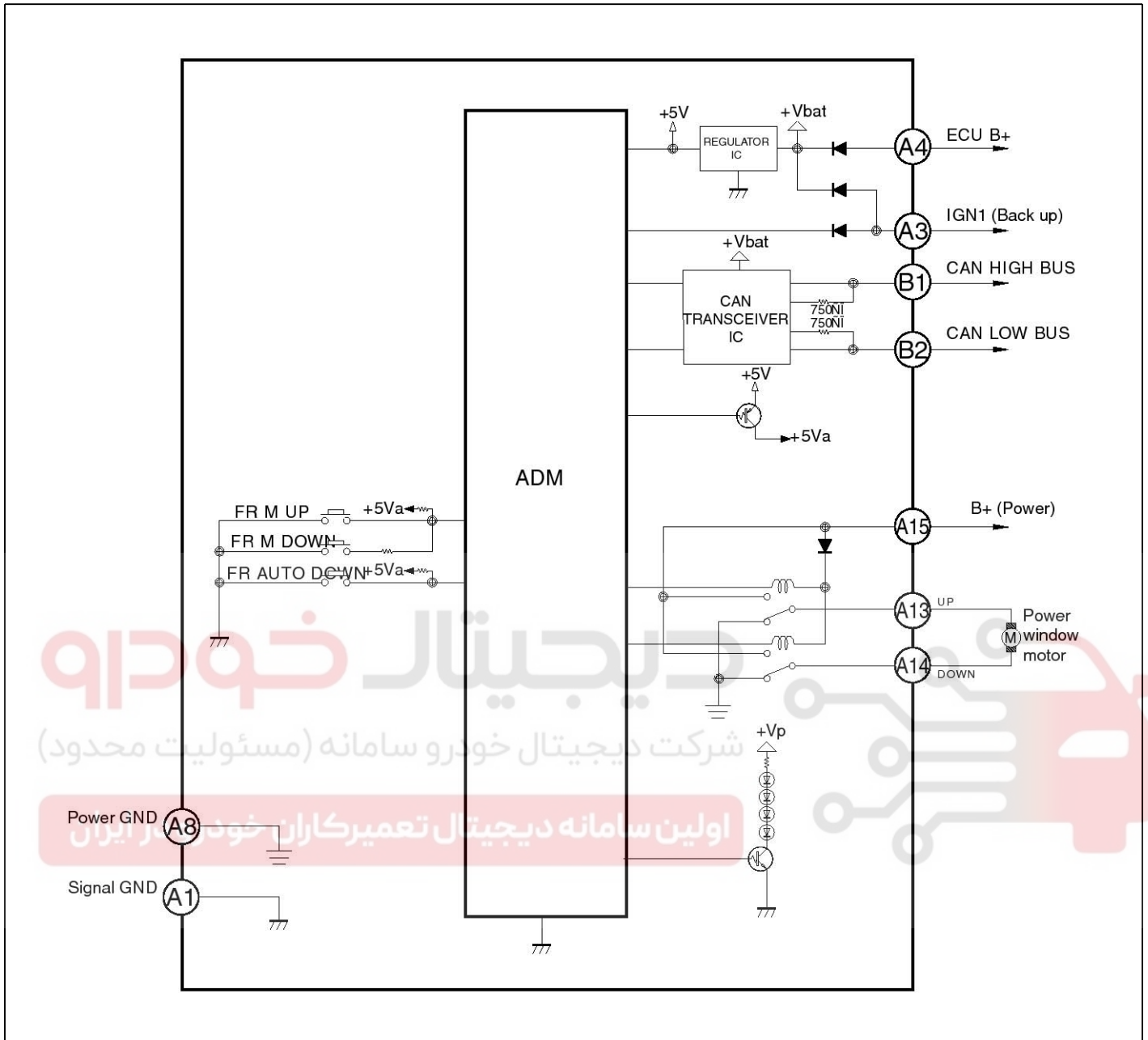
# BE-257



SVGBE0203L

# BE-258

# Body Electrical System

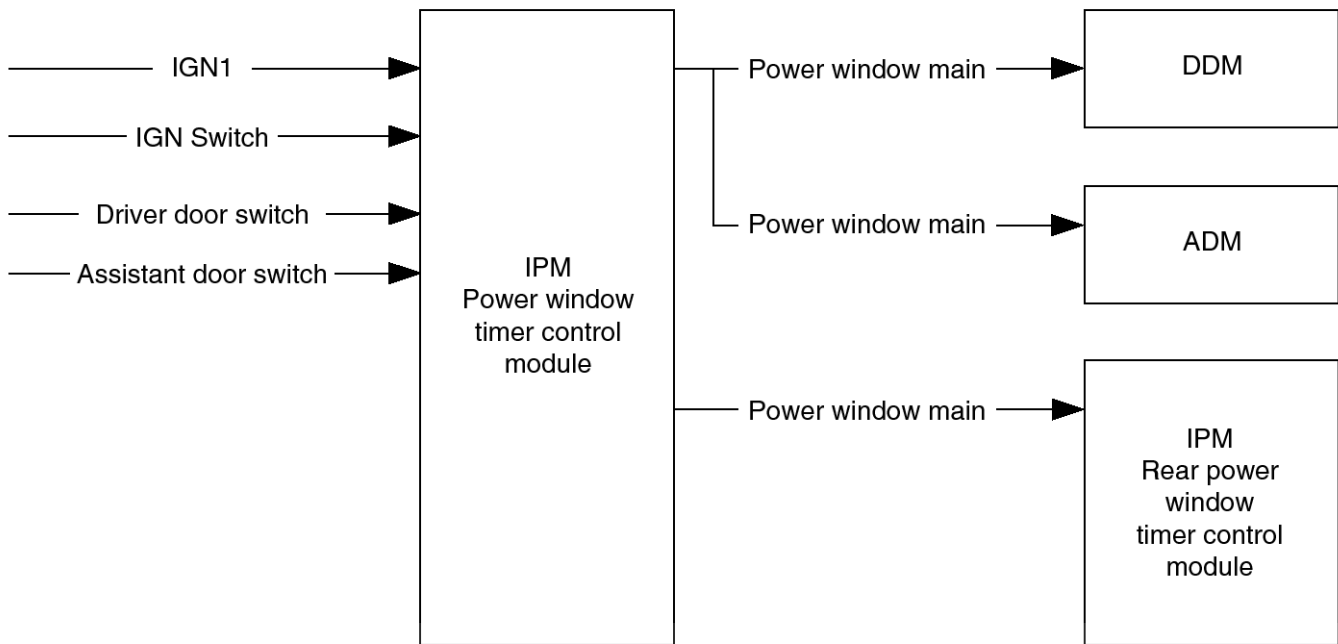


SVGBE0204L

# BCM (Body Control Module)

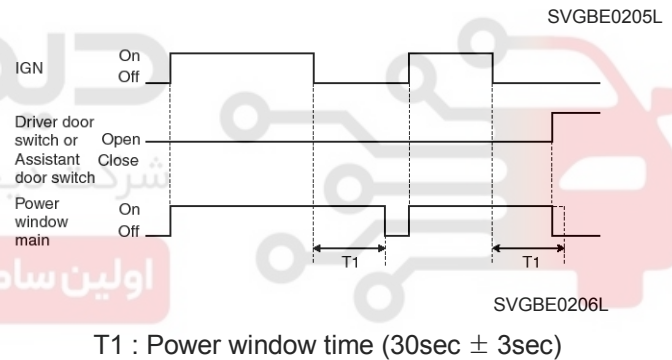
# BE-259

## Power Window Timer Control Function



### 1. Power Window Timer Control

- 1) After IGN1 is On, Power Window can operate and after IGN1 Off, it is possible to operate the Power window, for "PwdwTime" (30sec ± 3sec).
- 2) During counting the Power window Time(30sec ± 3sec), if Driver or Assistant side Door is open, the working the Power Window is stopped (Power window Main Off).



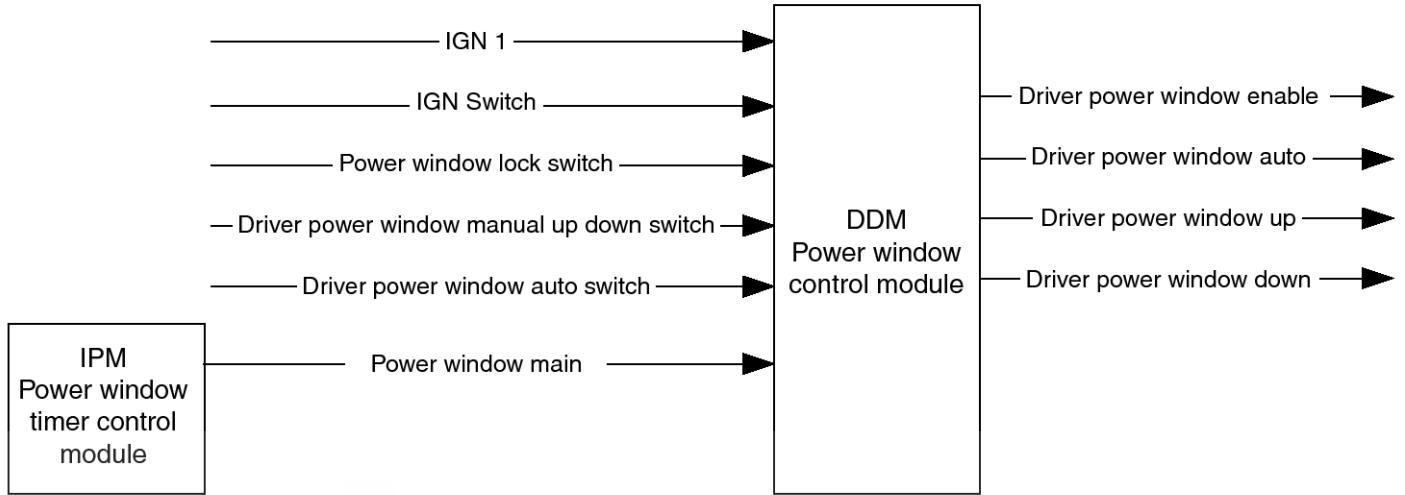
# BE-260

# Body Electrical System

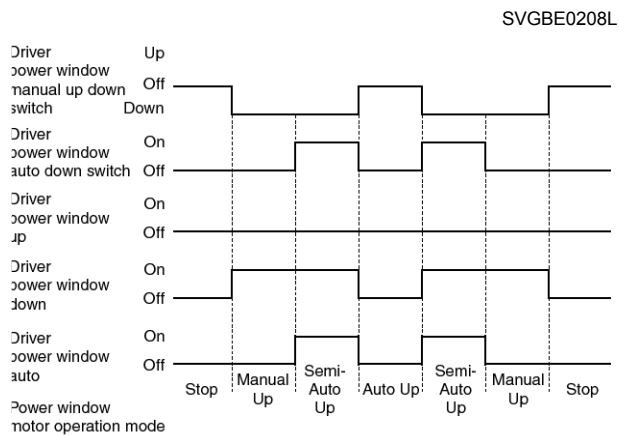
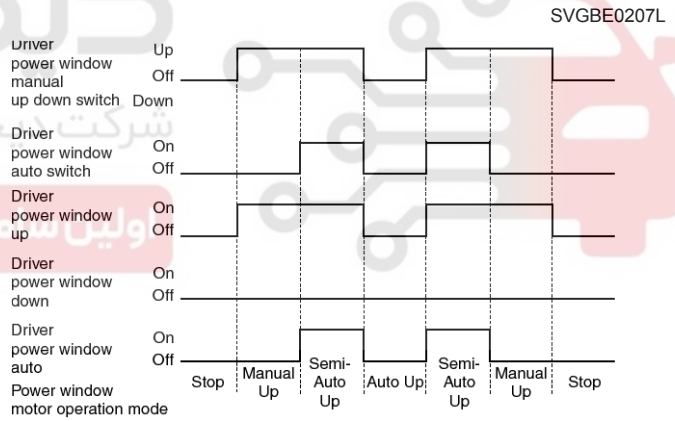
## Driver Power Window Control Function (For Safety)

- Driver Door Power Window Up Control in Manual Mode
- Driver Door Power Window Down Control in Manual Mode

- Driver Door Power Window Up Control in Automatic Mode
  - Driver Door Power Window Down Control in Automatic Mode
- (Driver Door Power Window takes Safety window system)



1. Driver Power Window Control Basic Strategy
  - 1) Window can operate (DRV Power window Enable On) during IGN1 On (IGN State On) or Power Window Main Timer On (Power window Main On).
  - 2) If user press manual mode window up(close) or down(open) Button, Power Window is up(close) or down(open) during pressing button.
  - 3) If user press Automatic mode window up or down button, Power Window is kept opening or closing until window is completely closed or opened.
  - 4) While window is opening or closing, if opposite direction signal is detected, window is stop.
  - 5) If user pressed up and down switch at the same time, window H/W is detected up side.  
DDM (UP) & DDM (Down) → Up



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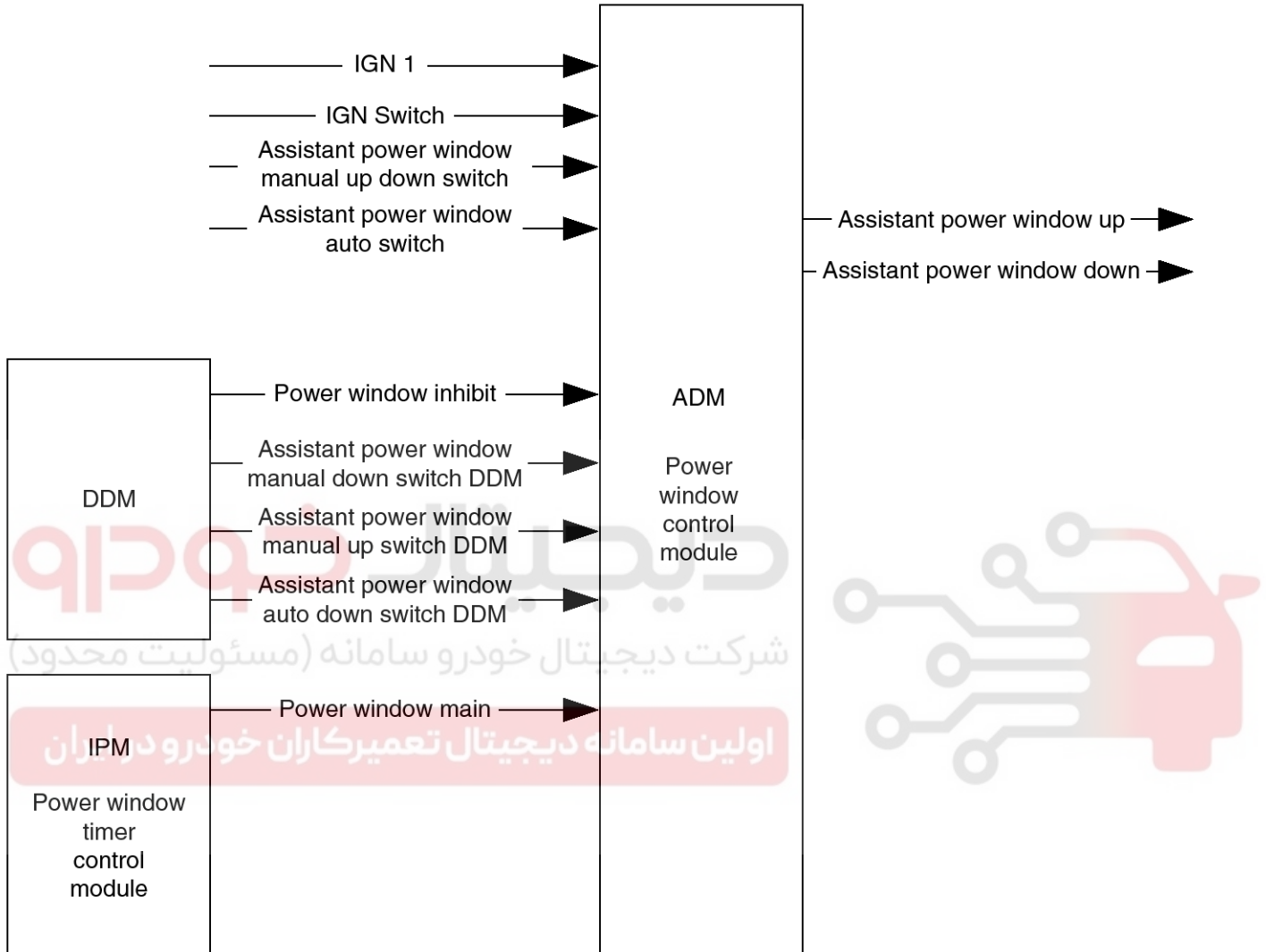
# BCM (Body Control Module)

# BE-261

## Assistant Power Window Control Function

- Assistant Power Window Up Control in Manual Mode

- Assistant Power Window Down Control in Manual Mode
- Assistant Power Window Down Control in Automatic Mode



SVGBE0213L

### 1. Assistant Power Window Control Basic Strategy

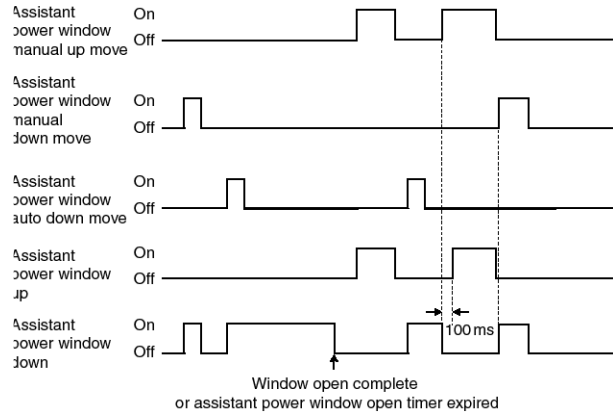
- 1) Window can operate during IGN1 On (IGN State On) or Power Window Main Timer On (Power window Main On).
- 2) If user press manual mode window up (close) or down (open) Button, Power Window is up (close) or down (open) during pressing button.
- 3) If user press Automatic down button, Power Window is kept opening until window is completely opened or timer (AST Power window Move Timer) is expired. But during Auto Mode operation, if there is any manual switch operation for assistant window, window is stop.

- 4) During pressed manual down button, Power Window is kept opening until window timer (AST Power window Move Timer) is expired during pressed.
- 5) While window is manual opening or closing, if opposite direction signal is detected, window is stop.
- 6) If user pressed up and down switch at the same time, window H/W is detected up side.  
 ADM (UP) & ADM (Down) → Up  
 DDM (UP) & ADM (Down) → don't operate  
 DDM (Down) & ADM (UP) → don't operate

BE-262

Body Electrical System

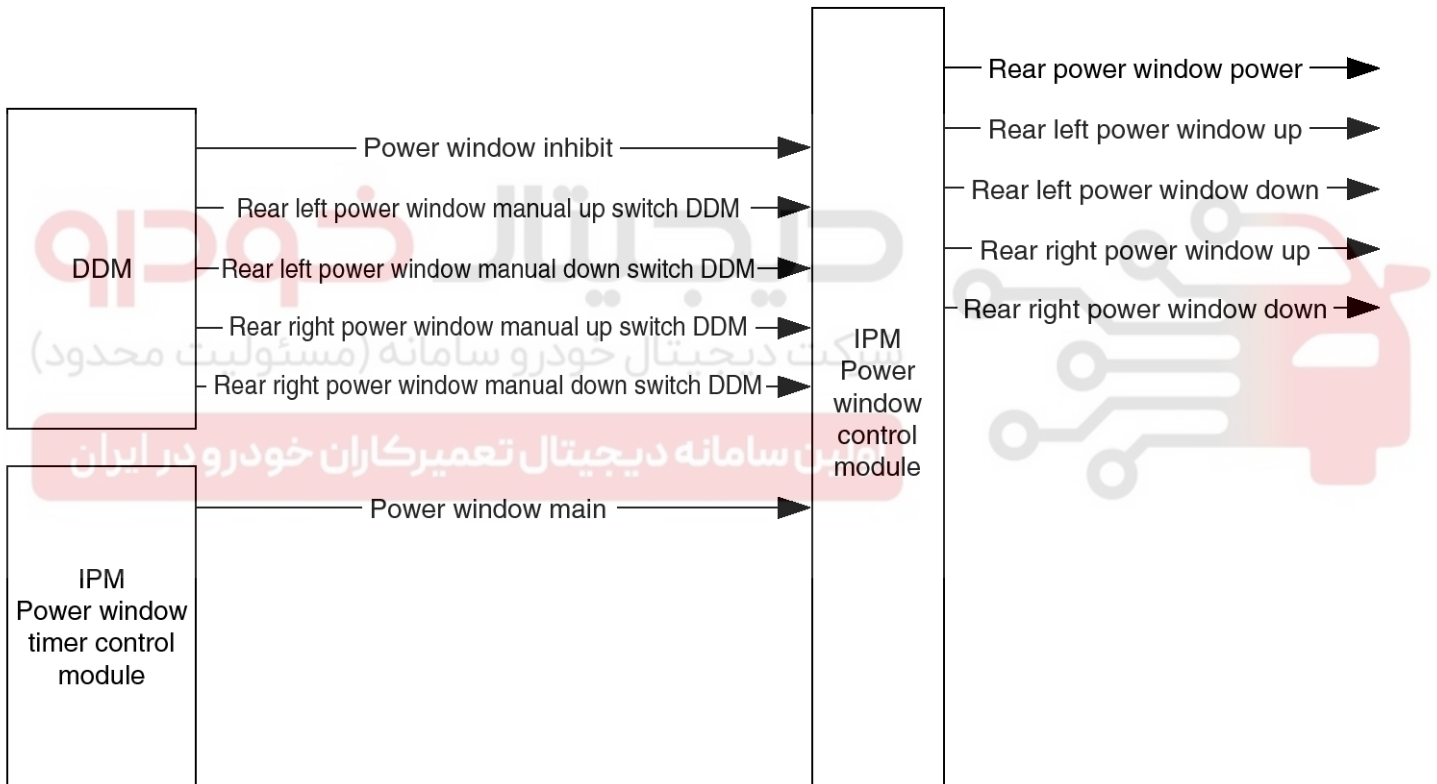
- 7) If user presses the window Lock SW (Power window Inhibit On), Assistant power window can not operation by any switch.
  - 8) If Manual and Auto SW are pushed at a same time from different side (DDM, ADM), window operate as MANUAL mode. (Refer to below Table)
- DDM (Auto) & ADM (Manual) → Manual  
 DDM (Manual) & ADM (Auto) → Manual



SVGBE0210L

Rear Power Window Control Function

- Rear Power Window Up/Down Control

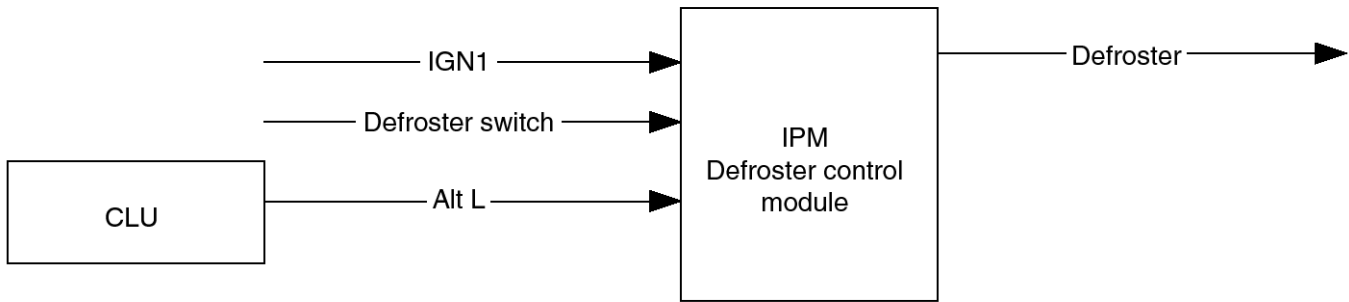


SVGBE0211L

# BCM (Body Control Module)

# BE-263

## Defroster Control System



SVGBE0212L

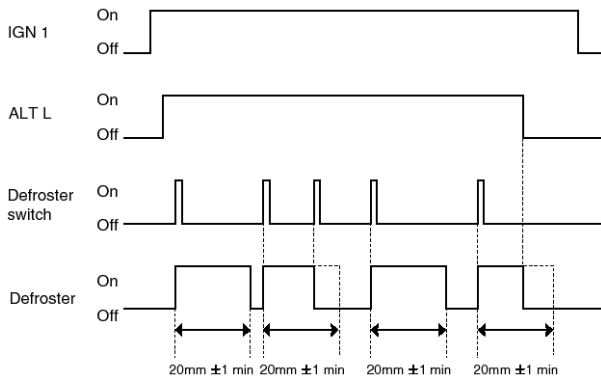
| No | Pre-condition                         | Event                 | Result        |
|----|---------------------------------------|-----------------------|---------------|
| 1  | IGN1 On, Alternator On, Defroster Off | Defroster SW Off → On | Defroster On  |
| 2  | IGN1 On, Alternator On, Defroster On  | Alt L Off             | Defroster Off |
| 3  |                                       | IGN1 Off              |               |
| 4  |                                       | Defroster SW Off → On |               |

### 1. Goto Defroster On Condition

| State             | Description                        |
|-------------------|------------------------------------|
| Initial Condition | IGN1 On & Alt L On & Defroster Off |
| Event             | Defroster SW Off → On              |
| Action            | Defroster On                       |

### 2. Goto Defroster Off Condition

| State             | Description                                                                                                   |
|-------------------|---------------------------------------------------------------------------------------------------------------|
| Initial Condition | IGN1 On & Alt L On & Defroster On                                                                             |
| Event             | IGN1 Off or<br>Alt L Off or<br>Defroster SW Off → On or<br>From the defroster output On, when pass 20 minute. |
| Action            | Defroster Off                                                                                                 |



SVGBE0214L

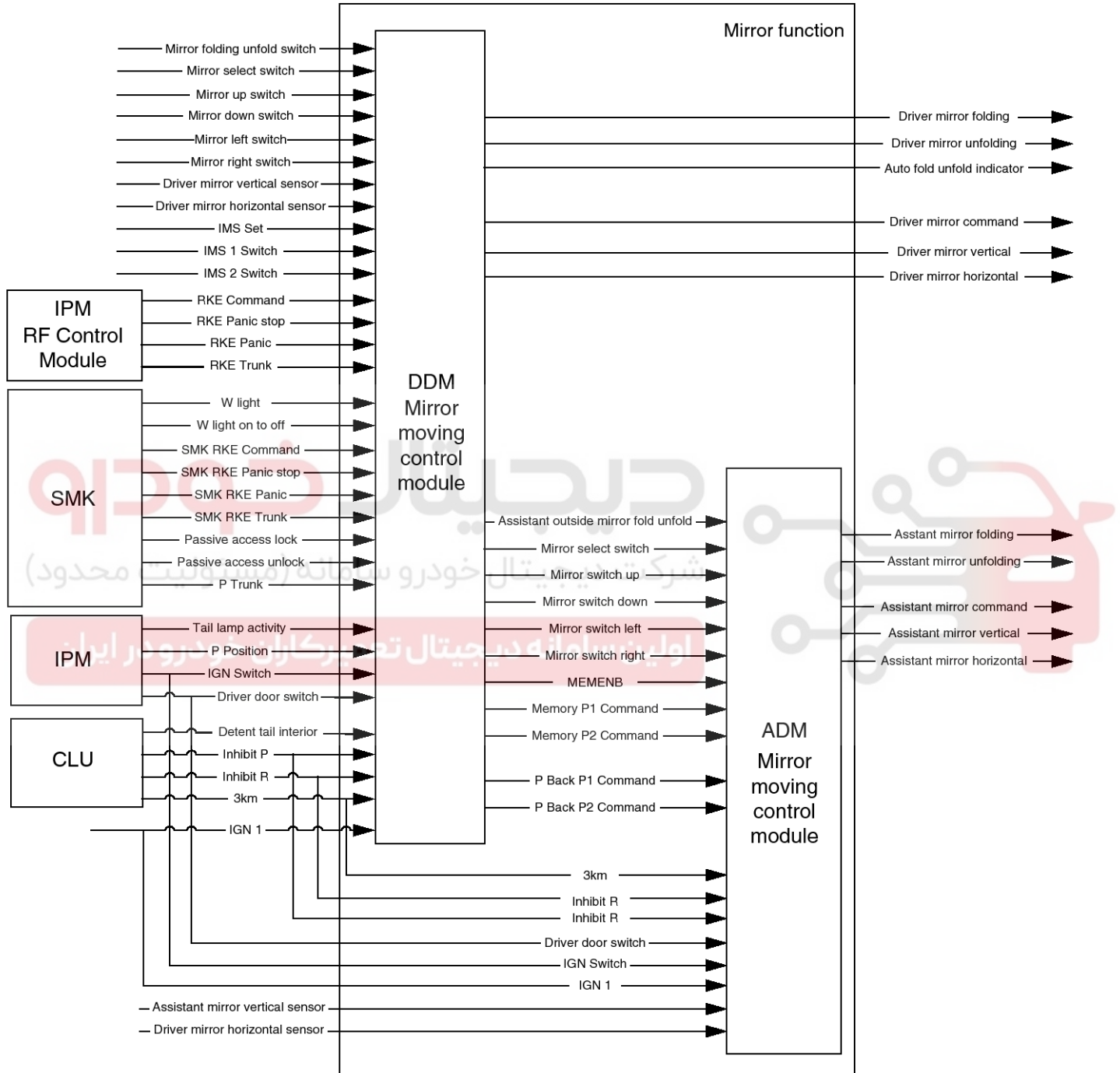


# BE-264

# Body Electrical System

## Outside Mirror Control Function

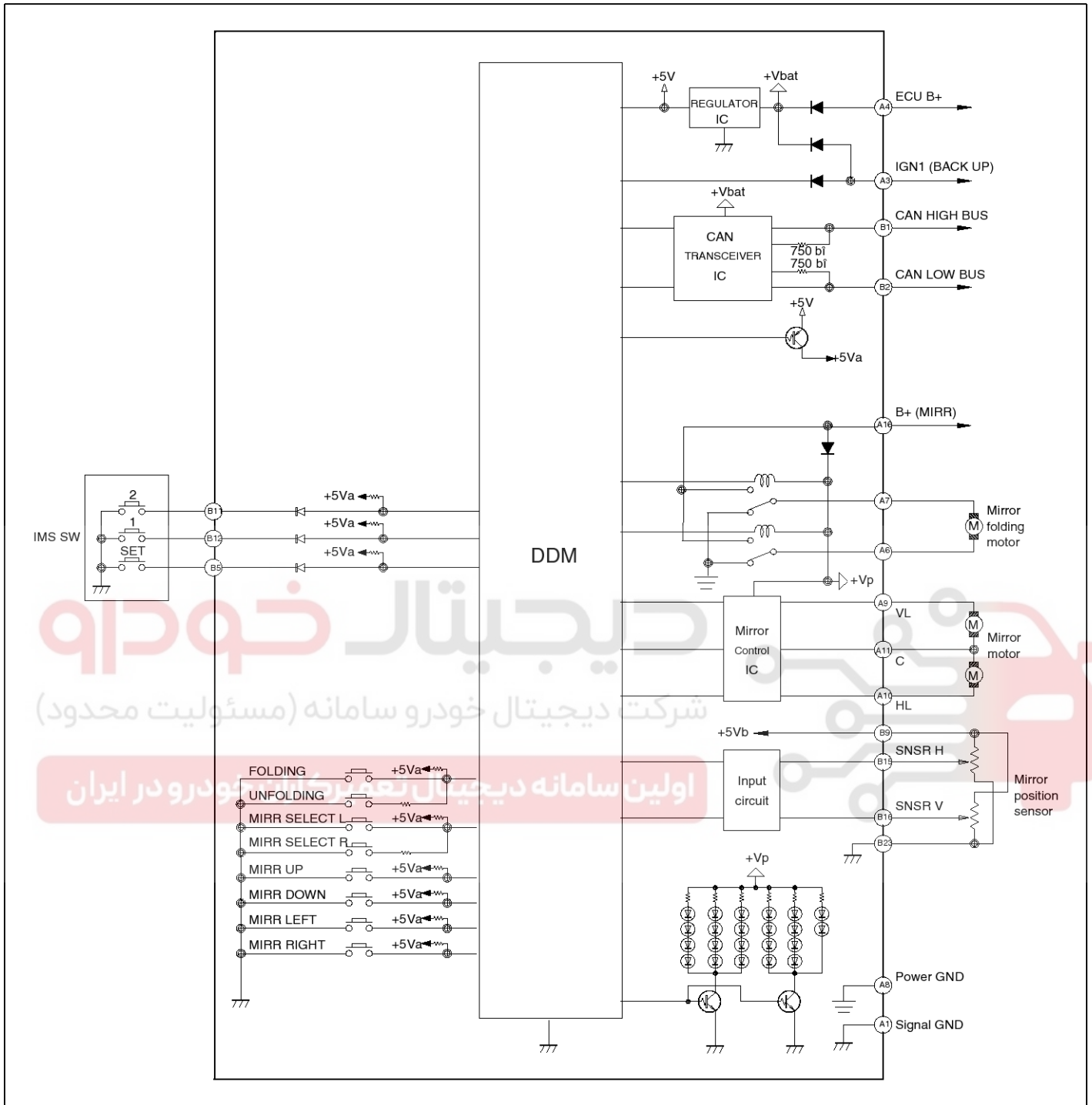
- Outside Mirror Folding/Unfolding Control
- Outside Mirror Position Control (Up/Down/Left/Right manual, Position Memory/Replay, Auto Reverse)



SVGBE0215L

# BCM (Body Control Module)

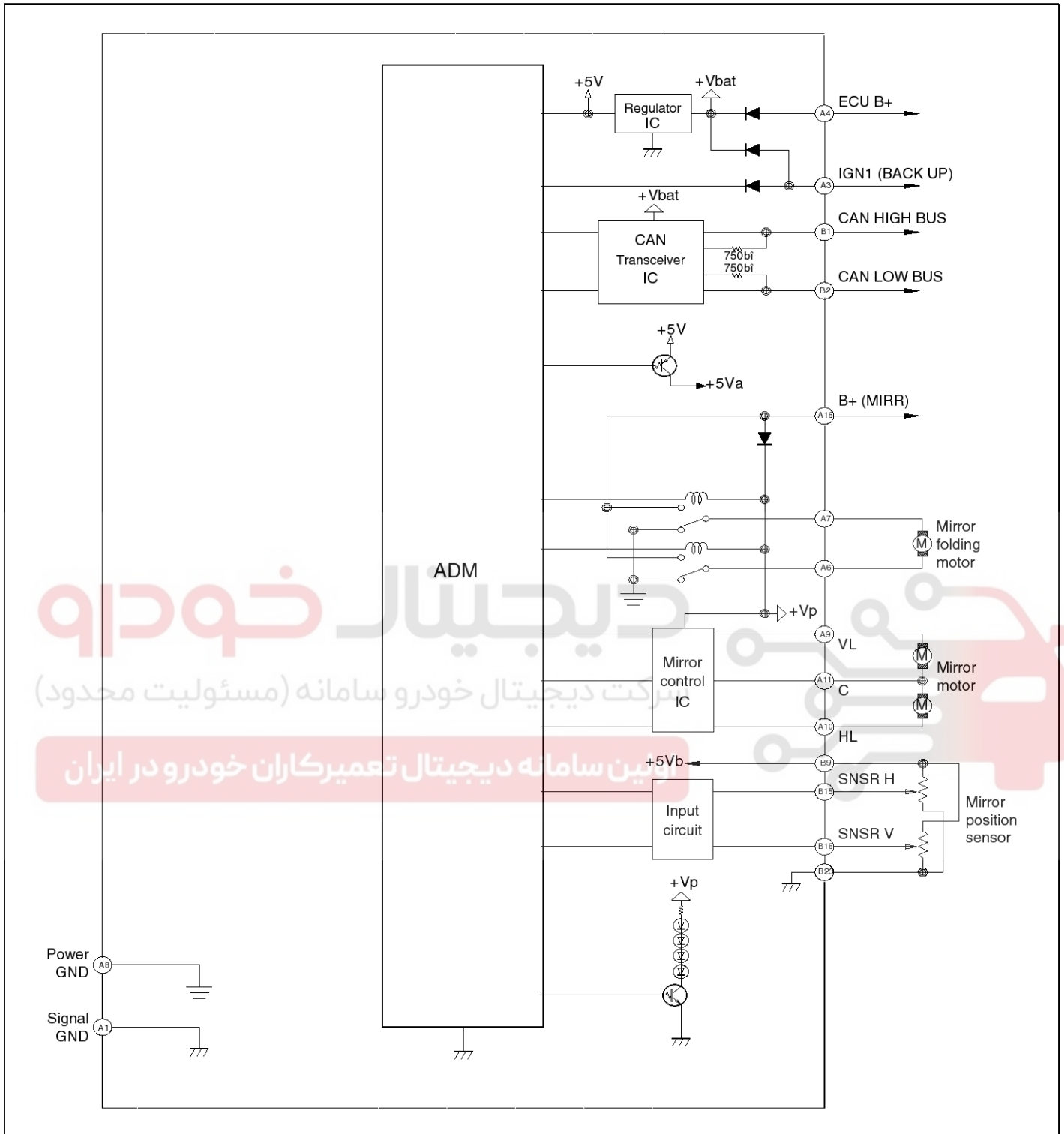
# BE-265



SVGBE0216L

# BE-266

# Body Electrical System



SVGBE0217L

**BCM (Body Control Module)****BE-267****Outside Mirror Folding/Unfolding Control Function**

Outside Mirror Folding/Unfolding Control for Seesaw Switch Type

| No | Pre-condition                                                       | Event                                                       | Result                                                              |
|----|---------------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------------------|
| 1  | Initial (after reset), ACC or Maintain no output status             | Switch state Fold On                                        | Folding output activated                                            |
| 2  | Initial (after reset), ACC or Maintain no output status             | Switch state Unfold On                                      | Unfolding output activated                                          |
| 3  | During Unfolding output, ACC or Maintain                            | Switch state Auto On                                        | Operating output continuous                                         |
| 4  | During Folding output, ACC or Maintain                              |                                                             |                                                                     |
| 5  | During Unfolding output, ACC or Maintain                            | Switch state Fold On                                        | Operating stop immediately Folding output active after delay time   |
| 6  | During Folding output, ACC or Maintain                              | Switch state Unfold On                                      | Operating stop immediately Unfolding output active after delay time |
| 7  | Switch state Unfold On                                              | ACC On event                                                | Unfolding output activated                                          |
| 8  | Switch state Fold On                                                |                                                             | Folding output activated                                            |
| 9  | Switch state Auto On                                                |                                                             | Unfolding output activated                                          |
| 10 | Switch state Auto On no output status                               | Unlock command by RKE, Fob, Passive Access>Welcome light On | Unfolding output activated                                          |
| 11 | Switch state Auto On During Unfolding output                        |                                                             | Operating output continuous and timer out restarted                 |
| 12 | Switch state Auto On During Folding output                          |                                                             | Operating stop immediately Unfolding output active after delay time |
| 13 | Switch state Auto On no output status and no auto folding activated | Lock command by RKE, Fob, Passive Access                    | Folding output activated                                            |
| 14 | Switch state Auto On During Unfolding output                        |                                                             | Operating stop immediately Folding output active after delay time   |
| 15 | Switch state Auto On During Folding output                          |                                                             | Operating output continuous and timer out restarted                 |
| 15 | Switch state Auto On During Folding output                          | Lock command by Welcome On to Off signal                    | Ignored                                                             |

## 1. Folding request Condition

- 1) Fold Switch event when mirror power supplied.
- 2) RKE Lock when switch is selected Auto (Neutral) status.
- 3) Passive Access Lock when switch is selected Auto (Neutral) status.

## 4) Fob RKE Lock when switch is selected Auto (Neutral) status.

- 5) When ACC On event is occurred and switch is fold state and memorized mirror status is unfold. (Last output was unfold)

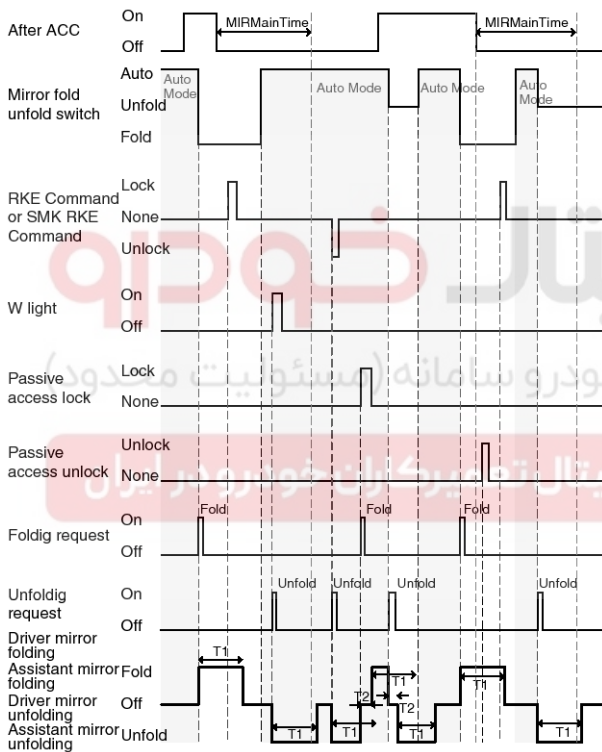
# BE-268

# Body Electrical System

## 2. Unfolding request Condition

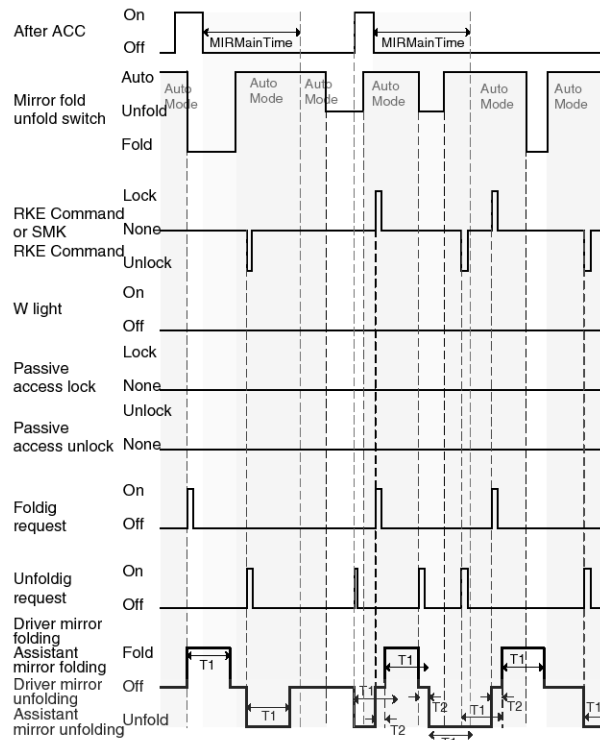
- 1) Unfold Switch event when mirror power supplied.
- 2) RKE Unlock when switch is selected Auto (Neutral) status.
- 3) Passive Access Unlock when switch is selected Auto (Neutral) status.
- 4) Fob RKE Unlock when switch is selected Auto (Neutral) status.
- 5) Welcome light turn on when switch is selected Auto (Neutral) status.
- 6) When ACC On event is occurred and switch is unfold state and memorized mirror status is fold. (Last output was fold)

## 3. Timing chart



SVGBE0218L

T1 : Fold unfold move time,  
T2 : Fold unfold delay time



SVGBE0219L

T1 : Fold unfold move time,  
T2 : Fold unfold delay time

## 4. Fold Unfold Switch Indicator

- 1) When the 'Seesaw' switch status is 'Auto' and over the ACC power (Power terminal switch state is ACC or IGN or START), Indicator is "On".
- 2) Indicator Bright level is different between day and night, it distinguish the bright level by 'Tail Lamp Activity' and 'Detent Tail Interior'.

# BCM (Body Control Module)

## BE-269

### Outside Mirror Position Control Function

#### 1. Outside Mirror Up/Down/Left/Right Control (Manual moving)

| No | Pre-condition          | Event                            | Result                    |
|----|------------------------|----------------------------------|---------------------------|
| 1  | Moving completed       | One direction button pressed     | Command direction operate |
| 2  | During one side moving | One direction button pressed     | Command direction operate |
| 3  | During one side moving | Select switch changed to neutral | Stop moving               |
| 4  | During one side moving | IGN,ACC,ST→ Key In, Key Off      |                           |

#### 2. Outside Mirror Position Memory / Replay Control (IMS)

| No | Pre-condition                              | Event              |                                       | Result                                                                                                               |
|----|--------------------------------------------|--------------------|---------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| 1  | Initial status<br>(nothing memory data)    | Press SET button   | After 5 sec, Press<br>1or 2 button    | Doesn't operate anything(Only CAN<br>replay command transmit)                                                        |
| 2  | have the memory data                       |                    |                                       | Loading to 1 or 2 memory position                                                                                    |
| 3  | During loading to memory position          |                    |                                       | Stop to currently moving when set<br>pressed and When Press 1or 2 butt-<br>on loading to 1 or 2 memory posi-<br>tion |
| 4  | Don't care                                 | Press SET button   |                                       | Current position saved to 1 or 2 me-<br>memory                                                                       |
| 5  | Maintain                                   |                    |                                       | Doesn't operate anything                                                                                             |
| 6  | During loading to memory position          |                    |                                       | Stop to currently moving when set<br>pressed and current position saved<br>to 1 or 2 memory                          |
| 7  | During loading to memory position          | Press SET button   |                                       | Stop to currently moving                                                                                             |
| 8  | Initial status<br>(nothing memory data)    | Press 1or 2 button | Within 5 sec, Pres-<br>s 1or 2 button | Doesn't operate anything(Only CAN<br>memory command transmit)                                                        |
| 9  | have the memory data                       |                    |                                       | Loading to 1 or 2 memory position                                                                                    |
| 10 | Maintain                                   |                    |                                       |                                                                                                                      |
| 11 | During loading to 1's memory posi-<br>tion | Press 1 button     |                                       | Loading continuous for first button<br>order                                                                         |
| 12 | During loading to 2's memory posi-<br>tion |                    |                                       | Stop to currently moving and<br>loading to 1's memory position                                                       |
| 13 | During loading to 1's memory posi-<br>tion | Press 2 button     |                                       | Stop to currently moving and<br>loading to 2's memory position                                                       |
| 14 | During loading to 2's memory posi-<br>tion |                    |                                       | Loading continuous for first button<br>order                                                                         |

## BE-270

## Body Electrical System

## 3. Outside Mirror Auto Reverse Control

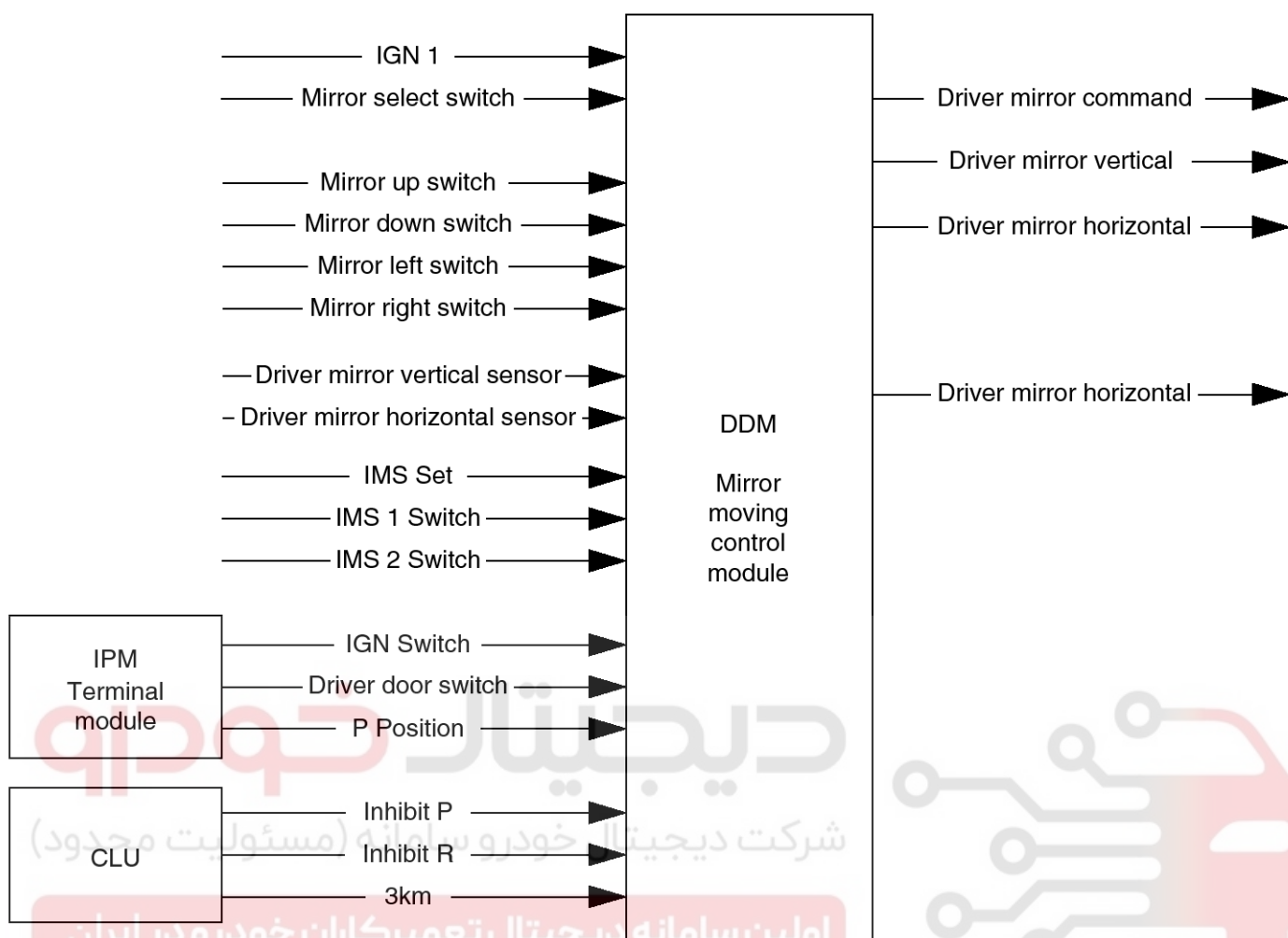
| No | Pre-condition                                                                                             | Event                              | Result                                                                                                  |
|----|-----------------------------------------------------------------------------------------------------------|------------------------------------|---------------------------------------------------------------------------------------------------------|
| 1  | Mirror select Swich choose Driver or Assistant                                                            | Shift level (Other → R)            | Auto Reverse operated                                                                                   |
| 2  | Auto Reverse mode(During Reverse action or Reverse action completed Manual operated in Auto reverse mode) | Shift level (R → Other)            | Self Return operated                                                                                    |
| 3  | After manual operated                                                                                     |                                    | Driver side only manual operated and does not operated Self Return Assistant side Self Return operated  |
| 4  | Mirror select Swich choose Driver and During to press Driver manual switch                                |                                    | Assistant side only manual operated and does not operated S-elf Return Driver side Self Return operated |
| 5  | Mirror select Swich choose Assistant and During to press Assistant manual switch                          | Mirror select Swich choose Neutral | Self Return operated                                                                                    |
| 6  | Auto Reverse mode(During Reverse action or Reverse action completed Manual operated in Auto reverse mode) |                                    |                                                                                                         |
| 7  | Mirror select Swich choose Driver in Auto Reverse mode                                                    | Driver Manual Swich pressed        | Driver side Manual operated Assistant side Auto Reverse operated                                        |
| 8  | Mirror select Swich choose Assistant in Auto Reverse mode                                                 | Assistant Manual Swich pressed     | Assistant Manual operated Driver side Auto Reverse operated                                             |
| 9  |                                                                                                           |                                    |                                                                                                         |

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



# BCM (Body Control Module)

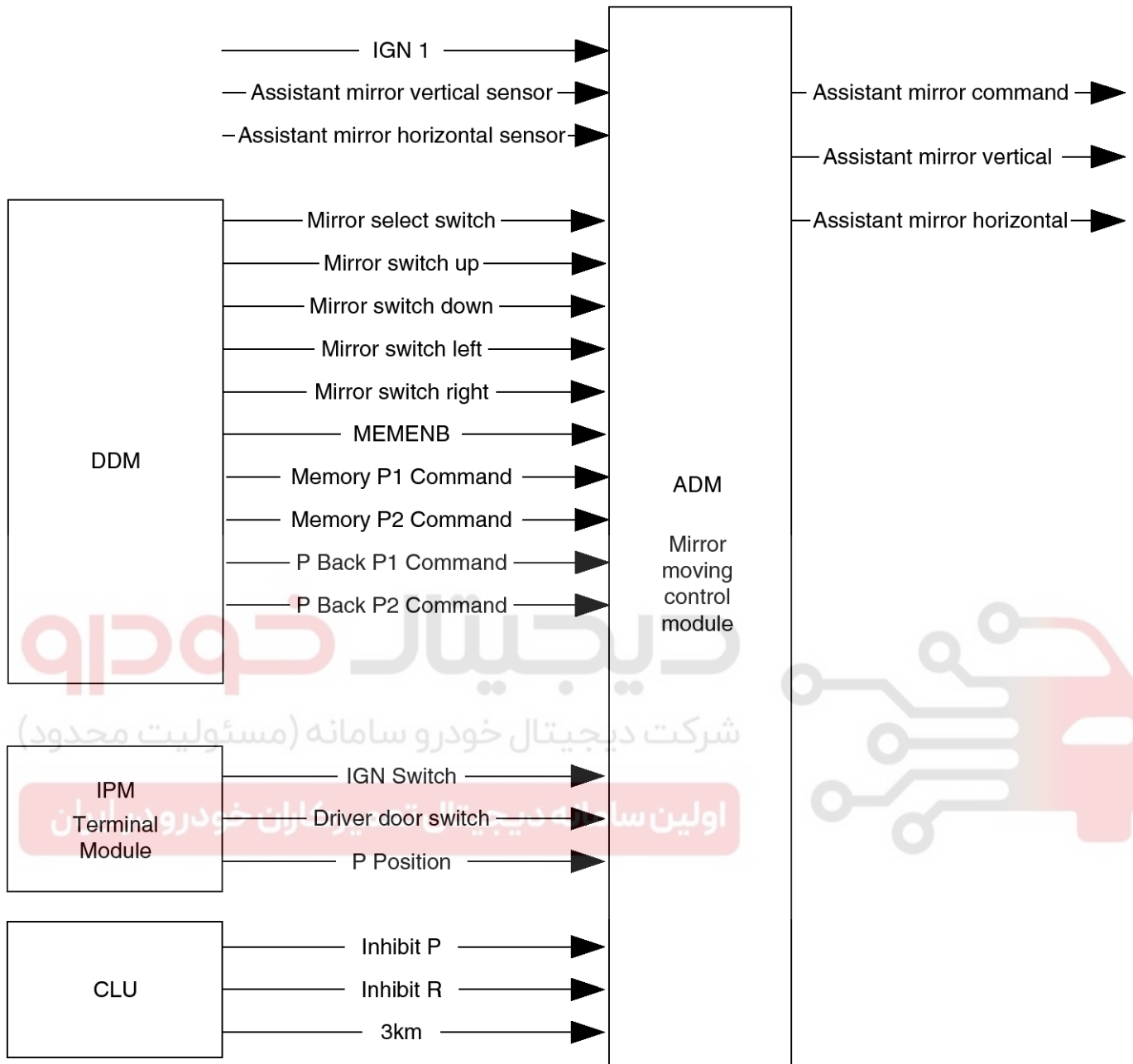
# BE-271



SVGBE0220L

# BE-272

# Body Electrical System



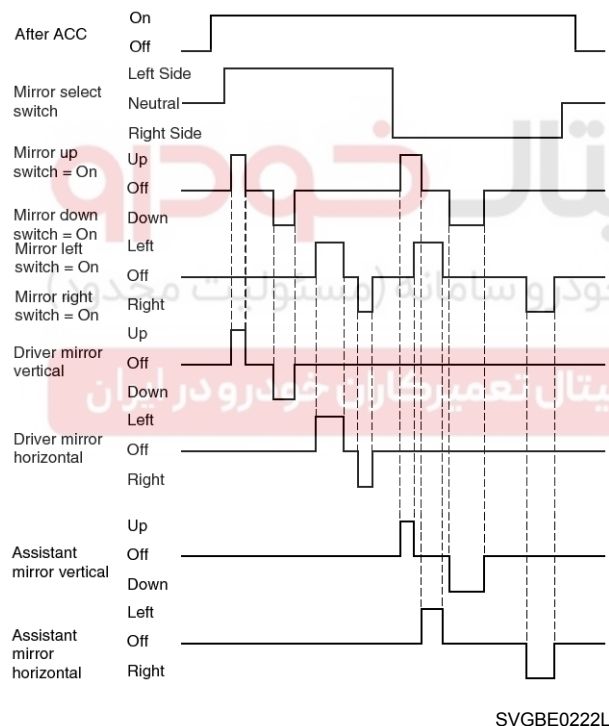
SVGBE0221L

# BCM (Body Control Module)

## BE-273

### Outside Mirror Up/Down/Left/Right Control

- In ACC On (IGN SW ACC or IGN SW IGN or IGN SW ST), if user set up the left side Mirror and press Outside Mirror Up/Down/Left/Right, Left Side Outside Mirror move Up/Down/Left/Right and set up the right side Mirror and press Outside Mirror Up/Down/Left/Right, Right Side Outside Mirror move Up/Down/Left/Right.
- If get two more input of Outside Mirror Up/Down/Left/Right, at a same time, Outside Mirror does not move.
- During moving Up/Down/Left/Right, if get other direction command, operation is stop
- Driver Side outside Mirror is controlled by direct logic signal input.
- Assistant Side outside Mirror is Controlled by CAN signal.

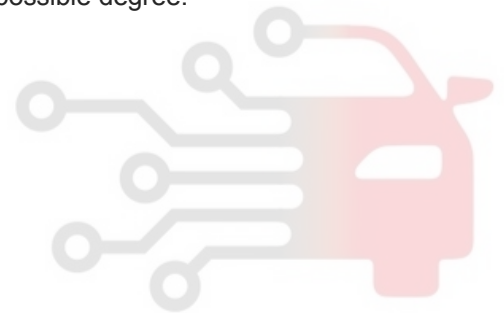


### Outside Mirror Position Memory/Replay Control

1. Position Memory by IMS Switch
  - 1) In IGN On Condition, if user press the IMS button(IMS Set Off → On), it is permitted to memorize the Outside Mirror position(Mirror Position Save Mode) during "MIR Save Mode Time". During this time duration, if press the position button Outside Mirror Position is saved in EEPROM corresponding button.
  - 2) During "Mirror Position Save Mode", if get two more position input, at a same time, these inputs are ignored.
  - 3) After to finish saving the position, expired the "MIR Save Mode Time", or Moving vehicle(Vehicle Speed  $\geq$  3km/h), or IGN1 Off, then "Mirror Position Save Mode" is released.
  - 4) This value is memorized in EEPROM and the numbers of storing place are 2 kinds of buttons.
  - 5) During saving operation, if you get the command it should be ignored.
  - 6) If Mirror is memorized data is not exist, Memory Archive signal set "Off".
2. Position Replay by IMS Switch
  - 1) In IGN On (IGN State On) or DRV door opened or during 30 seconds after DRV door open to close when IGN Off Condition (It used IMS Main signal), if user press the position button, Outside Mirror is play to memorized position.
  - 2) During replay operation, if you get the command it should be operating for new command.
  - 3) If get two more position input, at a same time, these inputs are ignored.
  - 4) In below condition, Outside Mirror Position replay is expired.
    - IGN1 Off & DRV DR SW Close (After 30 sec later)=> IMS Main Off or
    - "P State" Off or
    - Manual Moving Outside Mirror or
    - Moving vehicle(Vehicle Speed  $\geq$  3km/h) or
    - Enter "Mirror Position Memory Mode"

**BE-274****Body Electrical System**

- 5) In below condition, Outside Mirror Position replay is finished.
    - Mirror position does not move over 5sec or
    - After start replay it does not finish the replay action over 40sec(MIRAutoOutTime) or
    - After start replay, over the 15 sec same directions, it does not be found target position or
    - After reach the target position (Position is in the Error Bound; "MIRPosError")
  - 6) Mirror sensor voltage direction as follow:
    - Increasing voltage: UP, RIGHT
    - Decreasing voltage: DOWN, LEFT
  - 7) In replay ready mode, if you press the IMS button (1 or 2) then mirror operating replay for button memory position.
  - 8) In below condition, replay ready mode is expired.
    - "P State" Off
    - Manual Moving Outside Mirror or
    - Moving vehicle(Vehicle Speed  $\geq$  3km/h) or
    - No memory data
  - 9) During replay movement, If it changed to cranking (IGN SW ST), then replay should be temporarily stop for 30 seconds.
  - 10) Within 30 seconds, if starting power come back to ignition, then replay should be operated remained movement.
  - 11) If 30 seconds timer expired, replay doesn't back to move and escape the replay mode.
  - 12) If no memory data, Replay could not operating but CAN signal has to send to other ECU when replay ordered.
3. Outside Mirror Auto Reverse Control
    - In IGN On Condition, if user move the Shift Lever to R-Position, Auto Reverse function is activated.
    - Mirror Selection Switch has a 500msec Position confirm time. So, when Mirror Selection Switch is Left side (MIR Select SW Drive side (MIRR SEL SW Left); MIRR SEL SW Left), if want to do Off action, it is need keep the Off position (MIR Select SW Neutral; MIRR SEL SW Neutral) over the 500msec. If within 500msec, Mirror Selection Switch is return to Left side or Right Side, there is no Off Action.
    - Shift Lever's R position Switch (Inhibit R) has a 350msec Position confirm time. So when occur the transition of R-Position(Inhibit R Off  $\rightarrow$  On), after 350msec, do the transition action
    - Common case Auto Reverse Limit is 5 degrees down (voltage or fact value is depend on each product) form present position.
    - If could move down less 5 degrees, this case is go down possible degree.

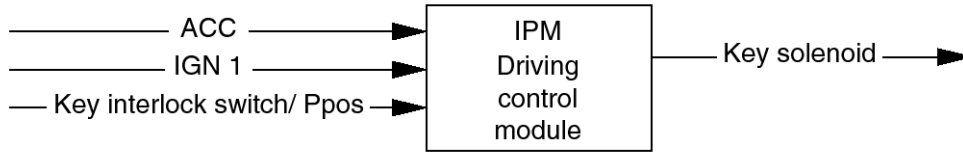


# BCM (Body Control Module)

# BE-275

## Driving Control System

### Key Interlock Solenoid Control



SVGBE0223L

| No | Pre-condition    | Event                    | Result                     |
|----|------------------|--------------------------|----------------------------|
| 1  | ACC On, IGN1 Off | Key Interlock Switch Off | Key Interlock Solenoid On  |
| 2  | IGN1 On          |                          |                            |
| 3  | -                | Key Interlock Switch On  | Key Interlock Solenoid Off |
| 4  |                  | ACC Off & IGN1 Off       |                            |

1. Key Interlock Function is to check the P position (Key interlock SW L P position) of Shift lever and Ignition Terminal position and make the key interlock solenoid On or Off.
2. When IGN1 is On or ACC is On, if Shift Lever is P Position (Key Interlock switch On), key interlock solenoid is Off (Key solenoid Off).

3. When IGN1 is On or ACC is On, if Shift Lever is not P Position (Key Interlock switch Off), key interlock solenoid is On (Key solenoid On).
4. During IGN1 is Off and ACC is Off, key interlock solenoid is Off (Key Solenoid Off).

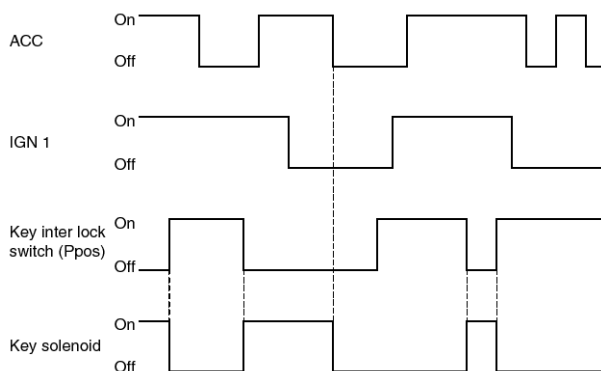
#### State Description

1. Goto Key Interlock OFF Condition

| State             | Description                                                                                                    |
|-------------------|----------------------------------------------------------------------------------------------------------------|
| Initial Condition | (IGN1 On or ACC On) & Key Interlock Switch Off                                                                 |
| Event             | <ul style="list-style-type: none"> <li>• Key Interlock Switch On or</li> <li>• IGN1 Off and ACC Off</li> </ul> |
| Action            | Key SOlenoid Off                                                                                               |

#### 2. Goto Key Interlock ON Condition

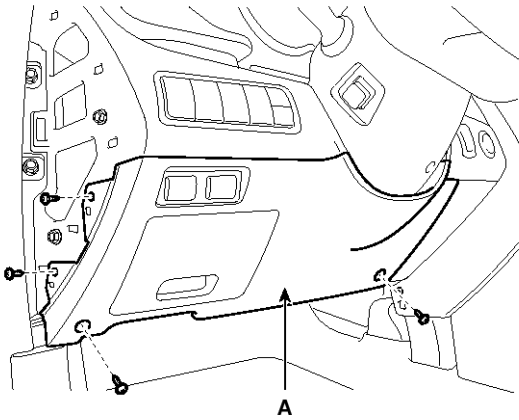
| State             | Description                                   |
|-------------------|-----------------------------------------------|
| Initial Condition | (IGN1 On or ACC On) & Key Interlock Switch On |
| Event             | Key Interlock SW Off                          |
| Action            | Key Solenoid On                               |



SVGBE0224L

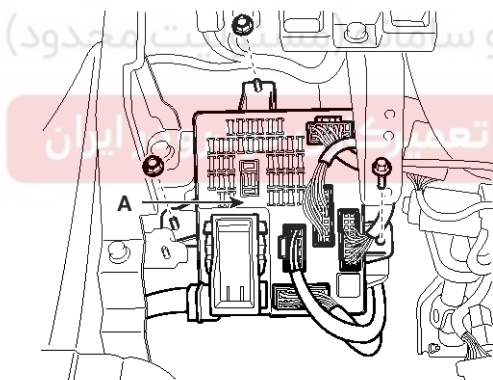
**BE-276****Body Electrical System****Removal**

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel (A).



SVGB10050D

3. Remove the Reinforcing panel after loosening the mounting bolt and nut.  
(Refer to the BD group - "Crash pad")
4. Disconnect the IPM connectors, loosening the nuts(2EA) and bolt (1EA).



SVGB10051D

5. Disconnect the rear connector, and then remove the IPM.

**Installation**

1. Install the IPM.
2. Install the reinforcing panel.
3. Install the crash pad lower panel.
4. Disconnect the negative (-) battery terminal.



# BCM (Body Control Module)

## BE-277

### IPM Diagnosis With GDS

1. It will be able to diagnose defects of IPM with GDS quickly. GDS can operate actuator forcefully, input/output value monitoring and self diagnosis.
2. Select model and "IPM".

3. Select the module to check.
4. Select "Input/output monitoring", if you will check current data of body network system. It provides input/output status of each module.

| Current Data                                       |       |      |
|----------------------------------------------------|-------|------|
| Sensor Name                                        | Value | Unit |
| <input type="checkbox"/> Parking brake switch      | PARK  | -    |
| <input type="checkbox"/> DRL option Line           | NONE  | -    |
| <input type="checkbox"/> HID option line           | NONE  | -    |
| <input type="checkbox"/> Rain sensor option line   | RAIN  | -    |
| <input type="checkbox"/> NAS Option Line           | OFF   | -    |
| <input type="checkbox"/> Tail Lamp LH Output       | OFF   | -    |
| <input type="checkbox"/> Tail Lamp RH Output       | OFF   | -    |
| <input type="checkbox"/> Tail lamp interior output | OFF   | -    |
| <input type="checkbox"/> Head lamp low LH output   | OFF   | -    |
| <input type="checkbox"/> Head lamp low RH output   | OFF   | -    |
| <input type="checkbox"/> Head Lamp High LH Output  | OFF   | -    |
| <input type="checkbox"/> Head Lamp High RH Output  | OFF   | -    |
| <input type="checkbox"/> Front Fog Output          | OFF   | -    |
| <input type="checkbox"/> Rear fog relay            | OFF   | -    |
| <input type="checkbox"/> Defogger / Deicer Relay   | OFF   | -    |
| <input type="checkbox"/> Burglar horn relay        | OFF   | -    |
| <input type="checkbox"/> Horn relay                | OFF   | -    |
| <input type="checkbox"/> Trunk release relay       | OFF   | -    |
| <input type="checkbox"/> Int Volume                | 2.25  | V    |
| <input type="checkbox"/> Auto light sensor         | 1.88  | V    |
| <input type="checkbox"/> Interior Mood lamp output | OFF   | -    |

SVGBE0231L



# BE-278

# Body Electrical System

5. If you will check each module data operation forcefully, select "Actuation test".

Actuation Test
☰

| Test Items                                      |  |
|-------------------------------------------------|--|
| Turn LH Output                                  |  |
| Turn RH Output                                  |  |
| Front Fog Lamp                                  |  |
| Rear fog lamp relay                             |  |
| External Buzzer Output                          |  |
| Defogger / Deicer Relay                         |  |
| Room lamp                                       |  |
| Ignition key hole illumination(Manual Key Type) |  |
| Security LED Output                             |  |
| Assist seat belt indicator                      |  |
| Manual HLLD Signal Output                       |  |
| Auto light power                                |  |
| AV Tail                                         |  |
| Key Interlock Solenoid(Manual Key Type)         |  |
| Interior Mood Lamp Output                       |  |

Start

Stop

SVGBE0232L

6. To check the DTC of the each module, select "DIAGNOSTIC TROUBLE CODES".

DTC
☰

Erase All DTC

Freeze Frame

DTC Status

Erase Selective DTC

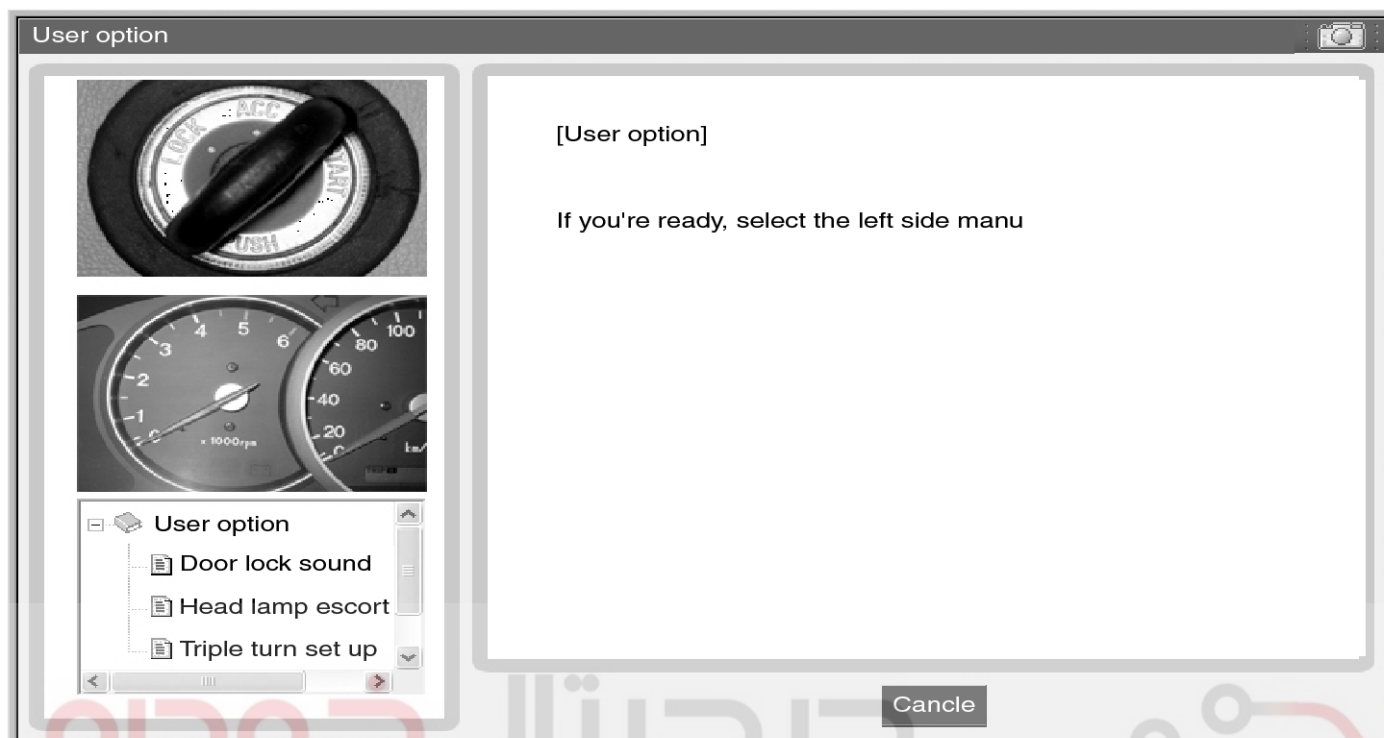
| Description           | State |  |
|-----------------------|-------|--|
| - DTC NOT Supported - |       |  |
|                       |       |  |
|                       |       |  |
|                       |       |  |
|                       |       |  |
|                       |       |  |
|                       |       |  |
|                       |       |  |

SVIBE9263L

## BCM (Body Control Module)

## BE-279

7. If you want to change user option, select "user option".



SVGBE0233L

شرکت دیجیتال خودرو (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

**BE-280****Body Electrical System****IMS (Integrated Memory)****Specifications****IMS Electrical System**

| Item                    | Specification |
|-------------------------|---------------|
| Rating voltage          | DC 12V        |
| Operating voltage       | DC 9V ~ 16V   |
| Operating temperature   | -30°C ~ +80°C |
| Maintaining temperature | -40°C ~ +85°C |
| Max, humid              | 95%           |
| Consumption current     | MAX 700mA     |
| Dark current            | Below 2mA     |

**Motor Electrical System**

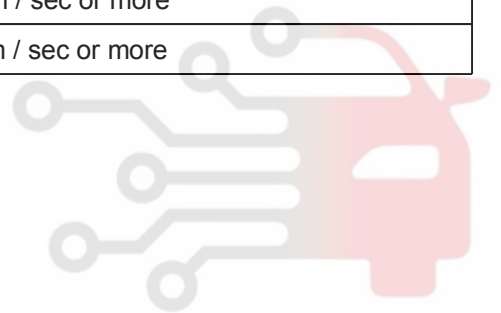
| Item             | Specification                                     |
|------------------|---------------------------------------------------|
| Rating voltage   | 13.5V (Slide, Recline, Front height, Rear height) |
| Current          | Slide : 8A                                        |
|                  | Recline : 8A                                      |
|                  | Front height : 7.5A                               |
|                  | Rear height : 7.5A                                |
| At worst current | Slide : 24A                                       |
|                  | Recline : 20A                                     |
|                  | Front height : 25A                                |
|                  | Rear height : 27A                                 |

**IMS (Integrated Memory)****BE-281****Mechanical System**

| Item                                       | Specification                                                                      |
|--------------------------------------------|------------------------------------------------------------------------------------|
| Type                                       | Motor with hall IC                                                                 |
| Duty ratio                                 | 50 ± 15                                                                            |
| Total stroke                               | Slide : 240mm                                                                      |
|                                            | Recline : 63°                                                                      |
|                                            | Front height : 32mm (Motor)                                                        |
|                                            | Rear height : 52mm (Motor)                                                         |
| Total pulse number                         | Slide : 899                                                                        |
|                                            | Recline : 1,136                                                                    |
|                                            | Front height : 333                                                                 |
|                                            | Rear height : 412                                                                  |
| Moving speed<br>(Terminal voltage : 13.5V) | Slide (Forward) : 17.9 mm /sec or more,<br>Slide (Backward) : 20.2 mm /sec or more |
|                                            | Recline : 3.5 ° / sec                                                              |
|                                            | Front height : 7 mm / sec or more                                                  |
|                                            | Rear height : 7 mm / sec or more                                                   |

شرکت دیجیتال خودرو (مسئولیت محدود)

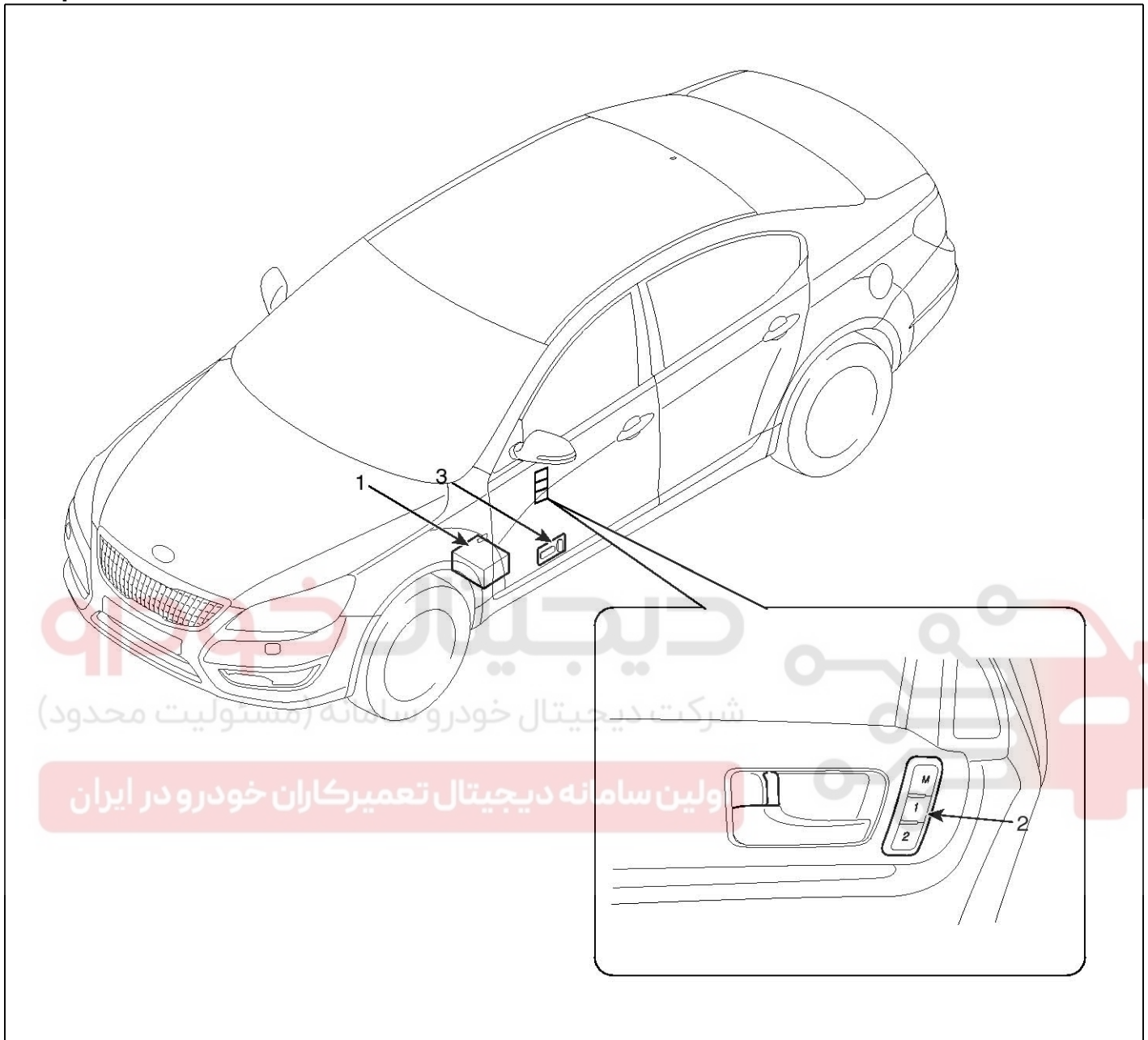
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



## BE-282

## Body Electrical System

## Component Location



SVGBE0390D

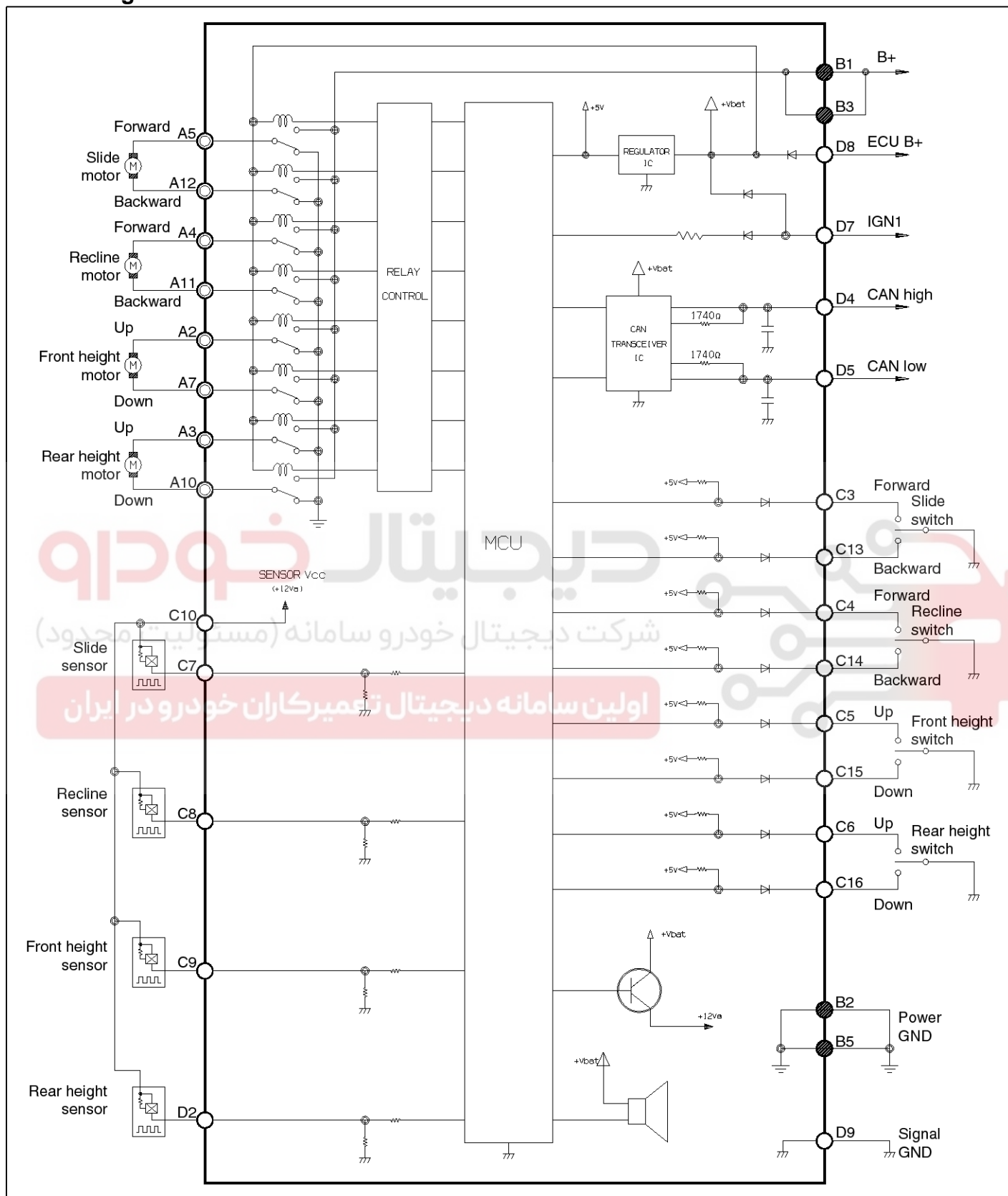
1. Seat Memory Unit (IMS)
2. IMS control switch

3. IMS driver power seat control

# IMS (Integrated Memory)

# BE-283

## Circuit Diagram



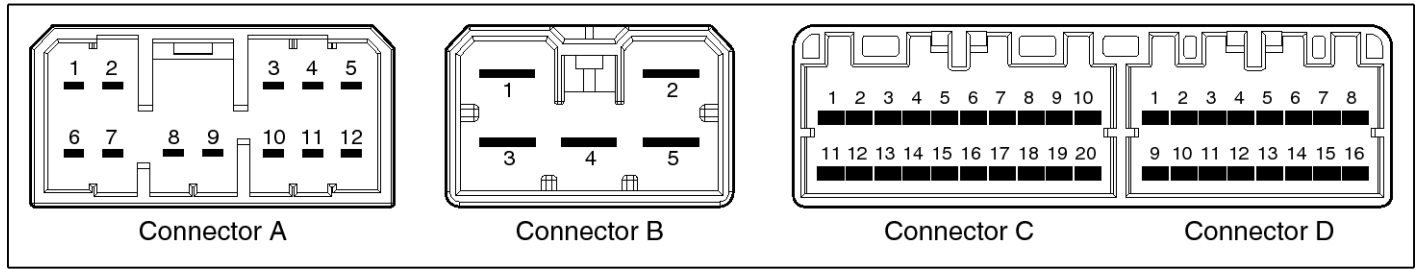
SVGBE0001L

# BE-284

# Body Electrical System

## Input/Output Specification

### Connector Pin Lay Out



SVGBE0002L

### IMS input/output pin information

| No  | Signal Name                | I/O | Contents                         | Remark       |
|-----|----------------------------|-----|----------------------------------|--------------|
| A1  | -                          | -   | -                                |              |
| A2  | FR height motor up         | O   | FR height motor up output        |              |
| A3  | RR height motor up         | O   | RR height motor up output        |              |
| A4  | Recline motor FR           | O   | Recline motor FR output          |              |
| A5  | Slide motor FR             | O   | Slide motor FR output            |              |
| A6  | -                          | -   | -                                |              |
| A7  | FR height motor down       | O   | FR height motor down output      |              |
| A8  | -                          | -   | -                                |              |
| A9  | -                          | -   | -                                |              |
| A10 | RR height motor down       | O   | RR height motor down output      |              |
| A11 | Recline motor RR           | O   | Recline motor RR output          |              |
| A12 | Slide motor RR             | O   | Slide motor RR output            |              |
| B1  | GND(Power)                 | I   | Power B+ for operating motor     |              |
| B2  | GND (Power)                | I   | Power GND for operating motor    |              |
| B3  | B+(Power)                  | I   | Power B+ for operating motor     |              |
| B4  | -                          | -   | -                                |              |
| B5  | GND (Power)                | I   | Power GND for operating motor    |              |
| C1  | -                          | -   | -                                |              |
| C2  | -                          | -   | -                                |              |
| C3  | Slide FR manual switch     | I   | Slide FR manual switch input     | On : GND     |
| C4  | Recline FR manual switch   | I   | Recline FR manual switch input   | On : GND     |
| C5  | FR height up manual switch | I   | FR height up manual switch input | On : GND     |
| C6  | RR height up manual switch | I   | RR height up manual switch input | On : GND     |
| C7  | Slide motor sensor         | I   | Slide motor sensor input         | Pulse signal |
| C8  | Recline motor sensor       | I   | Recline motor sensor input       | Pulse signal |
| C9  | FR height motor sensor     | I   | FR height motor sensor input     | Pulse signal |



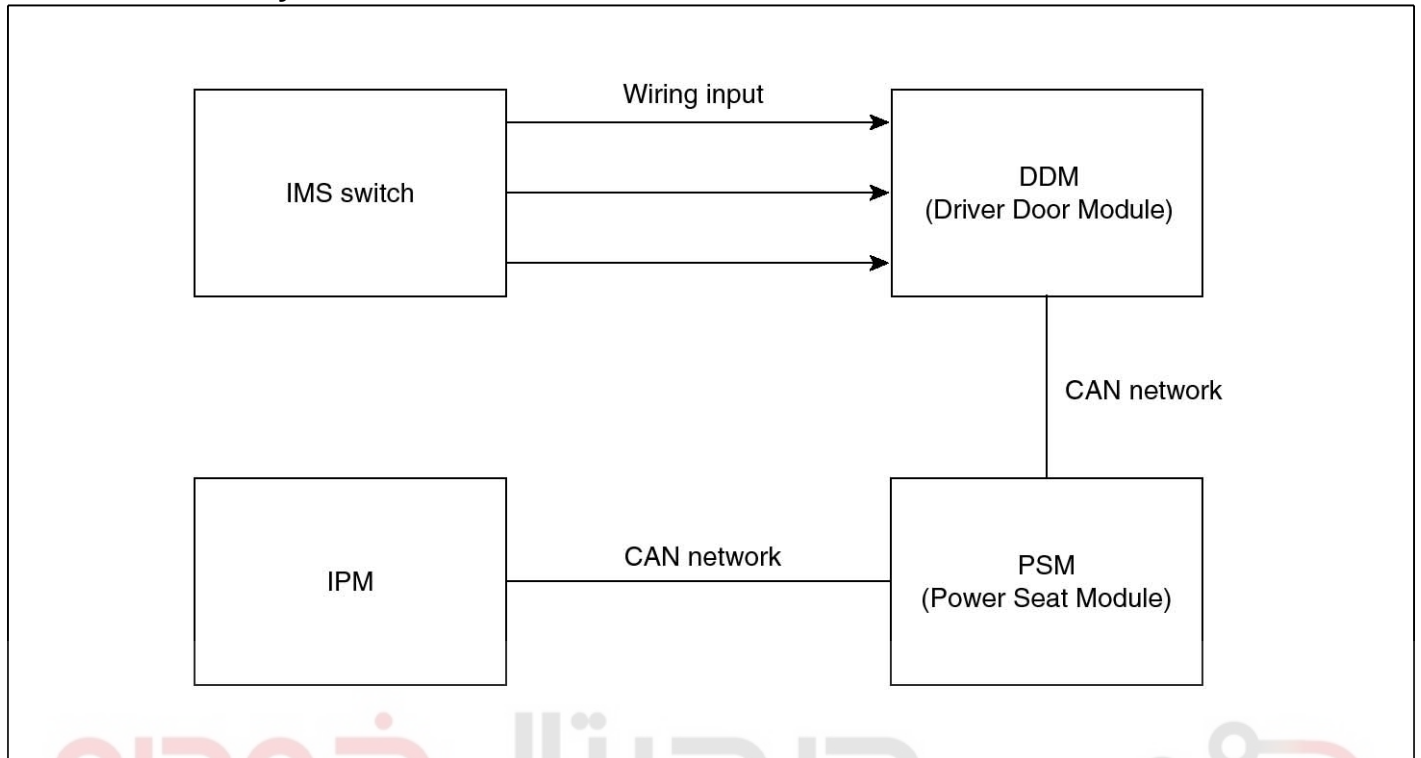
**IMS (Integrated Memory)****BE-285**

| No  | Signal Name                  | I/O | Contents                           | Remark       |
|-----|------------------------------|-----|------------------------------------|--------------|
| C10 | Sensor Vcc(Seat)             | O   | VCC for operating sensor           | 5V           |
| C11 | -                            | -   | -                                  |              |
| C12 | -                            | -   | -                                  |              |
| C13 | Slide RR manual switch       | I   | Slide RR manual switch input       | ON : GND     |
| C14 | Recline RR manual switch     | I   | Recline RR manual switch input     | ON : GND     |
| C15 | FR height down manual switch | I   | FR height down manual switch input | ON : GND     |
| C16 | RR height down manual switch | -   | RR height down manual switch input | ON : GND     |
| C17 | -                            | -   | -                                  |              |
| C18 | -                            | -   | -                                  |              |
| C19 | -                            | -   | -                                  |              |
| C20 | -                            | -   | -                                  |              |
| D1  | -                            | -   | -                                  |              |
| D2  | RR height up sensor          | I   | RR height up motor sensor          | Pulse signal |
| D3  | -                            | -   | -                                  |              |
| D4  | CAN high                     | I/O | CAN                                |              |
| D5  | CAN low                      | I/O | CAN                                |              |
| D6  | -                            | -   | -                                  |              |
| D7  | IGN1                         | I   | IGN1 input                         | BAT          |
| D8  | B+(ECU)                      | I   | ECU power input                    | BAT          |
| D9  | GND(ECU)                     | I   | ECU GND                            |              |
| D10 | -                            | -   | -                                  |              |
| D11 | -                            | -   | -                                  |              |
| D12 | -                            | -   | -                                  |              |
| D13 | -                            | -   | -                                  |              |
| D14 | -                            | -   | -                                  |              |
| D15 | -                            | -   | -                                  |              |
| D16 | -                            | -   | -                                  |              |

# BE-286

# Body Electrical System

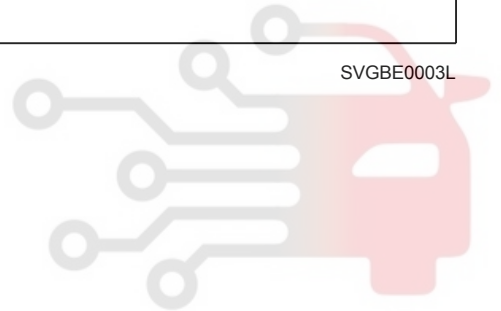
## Communication System



SVGBE0003L

دیجیتال خودرو  
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



# IMS (Integrated Memory)

## BE-287

### Description

#### system outline

An optimal seat position set by a driver can be memorized in Power seat unit by IMS SW, which enables restoration of seat position set by the driver despite

Playing of this function during drive is banned for safety reasons, and it has emergency stop function of restoration and gearing operation as well

#### Input Specification

##### 1. IGN2

IGN switch input is determined by Local switch "IGN2".

##### 2. SEAT MANUAL switch : SEAT Input

###### 1) SLIDE Front rear / rear right manual switch

Operating SLIDE motor of Seat either backward or forward

###### 2) Recline Front rear / rear right switch

Operating recline motor of seat either backward or forward

###### 3) Front rear height UP / DOWN manual switch

Operating Front rear height motor of SEAT either upward or downward

###### 4) Rear right height UP / DOWN manual switch

Operating rear right height motor of SEAT either upward or downward

##### 3. SEAT position Sensor (pulse Signal)

Sensing movement amount of Slide, Recline, Front rear height, and Rear right height motor

##### 4. "P" Position switch

Sensing "P" position of SHIFT LEVER, not allowed for memory saving and easy access function by getting on and off a vehicle in the position other than "P."

##### 5. Dr Door switch

Sensing that drive door opens

##### 6. IPM KEY IN

This signal is received for sensing state of KEY by IPM

##### 7. Local KEY IN switch

Sensing whether KEY is inserted or not.

##### 8. Speed

This signal is received for sensing vehicle speed by IPM

##### 9. IMS switch

###### 1) SET switch

Allowing for saving the SEAT position set by driver

###### 2) 1, 2 switch

Saving and replaying the SEAT position set by driver

#### CHATTERING Control in Input Signal

##### 1. Input switch - 40ms delay

SLIDE, RECLINE, Front rear height, rear right HEIGHT switch

"P" Position switch, SPEED, KEY IN, LOCAL KEY IN switch, DR DOOR switch, IGN2 switch

##### 2. IGN switch input is determined by Local switch "IGN2."

#### TIME Error

##### 1. $\pm 10\%$ , for TIME without error indication

$\pm 50\text{ms}$ , for TIME not exceeding 500ms

##### 2. Indicated time in each function does not include Time of controlling CHATTERING started from changing point of rr input.

## BE-288

## Body Electrical System

### Operation

#### Control Specification

##### 1. MANUAL Operation

- 1) MANUAL Seat Operation SEAT is to be operated by MANUAL switch Input of SEAT. SLIDE, RECLINE, Front rear height, and rear right height is available to operate manually with IGN2 ON regardless of ECU B+ OFF.

##### 2. MEMORY Saving Operation

###### 1) Allowing for Memory Storage

This process is allowed in case that IGN2 switch = ON, "P" Position switch = ON and SPEED input is high ( less than 3km/h ).

1 BUZZER output is generated from IMS by receiving the DATA, "SET = 1."

###### 2) Memory Saving Operation

When MEM\_1 or MEM\_2 of transmitted CAN communication DATA receives the DATA ("1") by IMS switch generated from 1 or 2 switch control in memory storage permission mode above, 2 BUZZER outputs are generated and current seat position is stored. ( IMS switch transmits storage command only if 1 or 2 switch input is generated within 5 seconds from SET switch OFF->ON, and the storage permission mode is cancelled if more than 5 seconds are elapsed.)

###### 3) Requirements for Memory Storage

MEMORY Storage is not allowed or cancelled in case that all of the following requirements are not met.

- Ignition switch is ON
- "P" Position switch is ON
- Vehicle speed input received from IPM is high ( less than 3Km/h )
- Less than 5 seconds elapsed from SET switch OFF->ON (determined by IMS switch )

###### 4) Memory SET is to be available for memory storage not with standing the number of SET times. (However, each MEMORY switch operation delivers 1 memory storage action only.)

###### 5) If MEMORY command is received during operating easy access function or reproducing memory, activation is stopped, and current position is stored.

If the command is received during operating MANUAL switch of SEAT, it will be stored where the memory command is received.

### Memory Reproduction

#### 1. Reproducing Memory

When "1" is received by DATA PL\_1 or PL\_2 of CAN communication transmitted by IMS switch generated from 1 or 2 switch operation, 1 BUZZER output is generated and SEAT position is automatically controlled, moving back to where it is stored to be according to MEMORY.

#### 2. Anti-Reproduction

Reproducing memory is not allowed if the following condition is not met.

IMS will reproduce memory, only if all of ① , ② and ③ are satisfied, and also either ④ or ⑤ is satisfied.

- ① "P" Position switch is ON
- ② Vehicle speed input received from IPM is high ( less than 3Km/h )
- ③ MANUAL switch of SEAT is not operated.
- ④ 1 and 2 switch of IMS switch is ON in case that driver door is open or within 30 seconds from driver door close.
- ⑤ Ignition switch is ON

#### 3. Stopping Memory Reproduction

Reproducing memory is stopped unless all of the following conditions are met.

- "P" Position switch of LOCAL switch is positioned at PARKING
  - Vehicle speed input received from IPM is high ( less than 3Km/h )
  - Target position of motor not reached
  - MANUAL switch of SEAT is not operated.
- BUZZER output is operated for USER to understand reproduction by other UNIT, regardless that MANUAL switch of SEAT is ON.
- SET switch is not operated

#### 4. Other

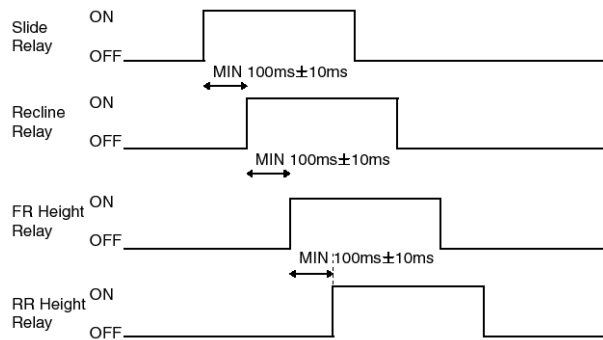
- 1) If memory is not stored, Reproduction will not be activated by 1 or 2 switch and BUZZER Output is generated.
- 2) The most recently received signal will be reproduced if other DATA (reproduction command) is received during reproducing memory.
- 3) If Input of SEAT MANUAL switch is operated during reproducing seat position, the activation should be completely stopped.
- 4) If ERROR occurs during operating SEAT, memory of related motor will clear.

# IMS (Integrated Memory)

## BE-289

### 5. Motor Driving Control

- 1) To prevent inrush current from being duplicated during driving motor, automated control of driving motor will defer driving time for 100ms each, and the priority is as follows. SLIDE > RECLINE > Front rear height > rear right height
- 2) Driving motor is executed in the following order, in case of reproduction process, and DELAY TIME among each motor is as follows.



SYFBE0279L

TIME value of each continuous driving motor (excluding operation by MANUAL switch)

SLIDE: 20 seconds, RECLINE: 35 seconds, Front rear height: 10 seconds, rear right height: 15 seconds

### 3) Motor Driving Control of Reverse Direction

If motor driving requires being in reverse direction during operating easy access function or reproduction process, driving in current direction is immediately stopped, and driving in the reverse direction will be operated following 100ms.

- 4) If distance difference between stored position on reproduction and current position is under the rated measurement, motor is not operating regardless of receiving reproduction DATA.  
\* SLIDE, RECLINE, Front rear height, rear right HEIGHT: 12EDGE (6PULSE)
- 5) Operation is stopped in reaching target position of motor, when operating easy access function or reproduction process.

### Easy access function

(user option - default : Operating easy access function)

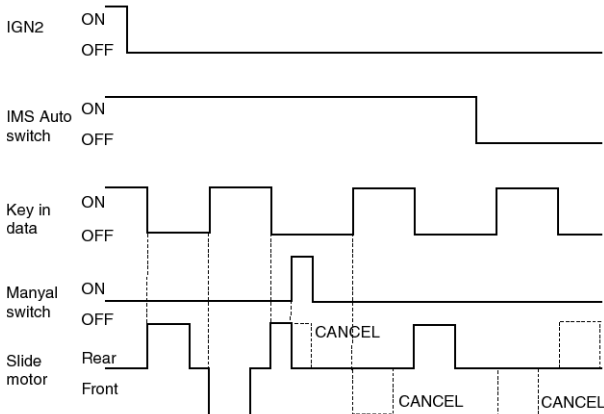
1. If Signal "IPM KEY IN" transmitted from IPM and signal "LOCAL KEY IN" in case that key is removed are changed from "LOW"(KEY IN) ->"HIGH" (KEY OFF), SEAT SLIDE is moved 50mm backward from KEY OUT position.
2. Signal "IPM KEY IN" transmitted from IPM or signal "LOCAL KEY IN" is changed from "HIGH" ( KEY OFF) ->"LOW" ( KEY IN ) by inserting KEY, it is moved to KEY OUT position.
3. Prohibiting and Stopping easy access operation. The following requirements are determined and controlled by IMS. If one of the following conditions is met during anti-operation or operation process, it is stopped.
  - 1) "P" Position switch is not ON  
(If "P" Position switch is OFF during operating, the operation is completed.)
  - 2) Vehicle data "SPEED" transmitted from IPM is LOW ( More than 3km/h )
  - 3) MANUAL switch of SEAT is in operation
  - 4) Reproduction command is received during easy access operation
  - 5) "AUTO\_SET" DATA transmitted from IMS switch has " OFF" value.  
(If "AUTO\_SET" is changed during operating, the operation is completed.)
  - 6) SET message transmitted from IMS switch is "1" during easy access operation
4. If control is stopped during moving backward, the backward action is paused without moving further. When returning, it moves just as much the distance as it previously moved backwards.
5. MANUAL switch Input is operated during or after moving backward, it will move to KEY OUT position on easy access operated by KEY IN.

# BE-290

# Body Electrical System

6. Condition to Restore Memory of riding position in a vehicle

- 1) MANUAL switch is operated in the level above Key IN
- 2) Reproducing memory is in operation



SYFBE0280L

### LIMIT Setting

1. LIMIT position is randomly set as following since there is no SLIDE, RECLINE, rear right height, and Front rear height LIMIT switch.

- 1) Control is immediately stopped, and the location in front of 6 pulse is set Driving LIMIT position, if more than 6PULSE is not generated for 2 seconds during initial operation by MANUAL switch or by easy access function after inserting battery.

(LIMIT position in reverse direction is the same as above.)

However, LIMIT position for Front rear height and rear right height is set if more than 6PULSE is not generated for a second.

- 2) If virtual LIMIT is set, MEMORY Reproduction is not operated off the LIMIT boundary for preventing motor damage by mechanical LOCK
- 3) If PULSE is correctly input away from the LIMIT boundary by MANUAL operation or by Easy access function with the previously set LIMIT applied, LIMIT position is renewed

### Detecting and Controlling ERROR

1. Detecting seat ERROR

ERROR is controlled if the following situation occurs during easy access operation, reproduction process and operating MANUAL switch of each motor.

1) ERROR resulted from PULSE is not input

| Direction / Item | Slide                                    | Recline | Front Rear Height                       | Rear Right Height |
|------------------|------------------------------------------|---------|-----------------------------------------|-------------------|
| ERROR Occurrence | Less than 6PULSE generated for 2 seconds |         | Less than 6PULSE generated for 1 second |                   |
| Precondition     | LIMIT Setting Completed                  |         |                                         |                   |

SYFBE0281L

Related motor output is stopped if ERROR is detected during reproduction and easy access operation

Related motor output is stopped, if ERROR is found in MANUAL operation.

2) Sensor Vcc of Seat is detected as much as 40ms from less than 1V. => Return if Sensor Vcc of Seat is over 7V.

If SEAT Sensor Vcc ERROR is detected during reproduction and easy access operation, all operating SEAT motor is stopped. (BUZZER output is not operated.)

2. ERROR Control

If ERROR is detected as shown above, it is considered to be caused by broken HARNESS or Sensor malfunctioning, and is controlled as following.

- BUZZER output is operated during receiving storage and reproduction command regardless of ERROR occurrence
- Paused easy access operation and memory reproduction is available to be re-activated from operating MEMORY command after motor malfunctioning is repaired, and it is as following.

(When SLIDE motor is repaired from Sensor ERROR, Easy access function is available)

SEAT: 6PULSE is correctly input from ERROR causing motor position Sensor by operating MANUAL switch with in 2 seconds (SLIDE, RECLINE)/ 1 second(Front rear height, Rear right height).

### Determining Seat Position

Seat position is relatively determined rather than by absolute position.



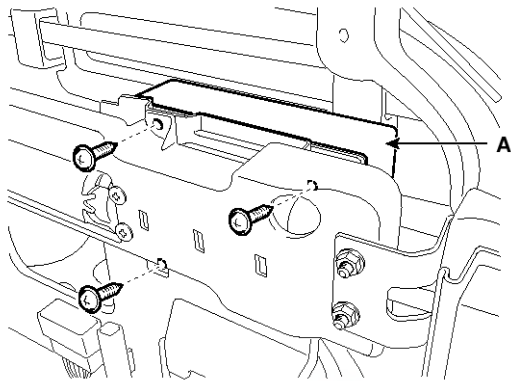
# IMS (Integrated Memory)

## BE-291

### IMS (Integrated Memory System) module

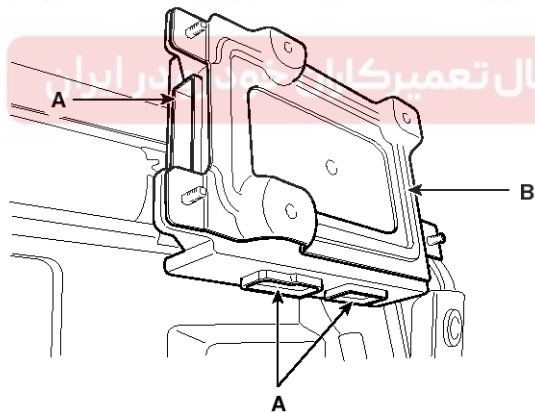
#### Removal

1. Remove the negative (-) battery terminal.
2. Remove the driver seat in the car.  
(Refer to the BD group - "Front seat")
3. Remove the IMS module (A) after loosening 3 screws in the bottom of seat.



SVGBE0393D

4. Disconnect the IMS module connector (A) and then remove the IMS module (B).



SVGBE0394D

#### Installation

1. Install the IMS module after reconnecting the connector.
2. Install the driver seat.

#### NOTICE

- Make sure the IMS module connectors and related connectors are plugged in properly.
- Check that IMS system operates normally.



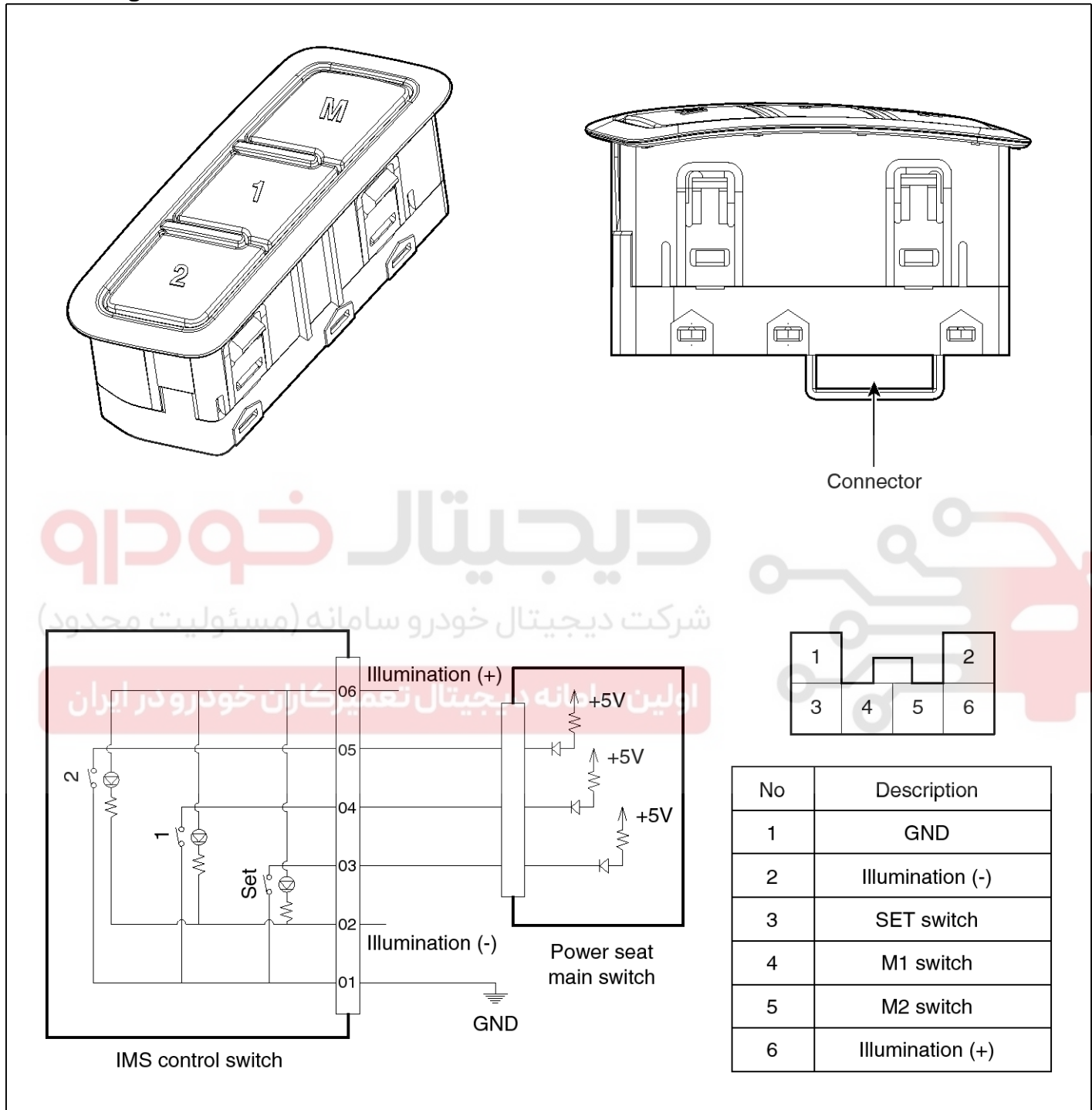


# BE-292

# Body Electrical System

## IMS Control Switch

### Circuit diagram



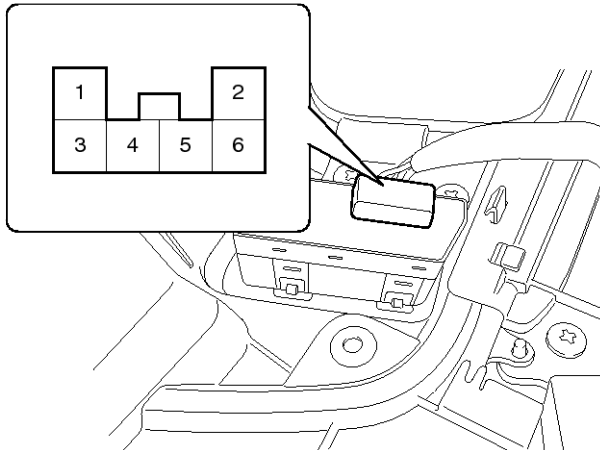
SVGBE0004L

# IMS (Integrated Memory)

# BE-293

## Inspection

1. Disconnect the IMS control switch connector.



SVGB10139D

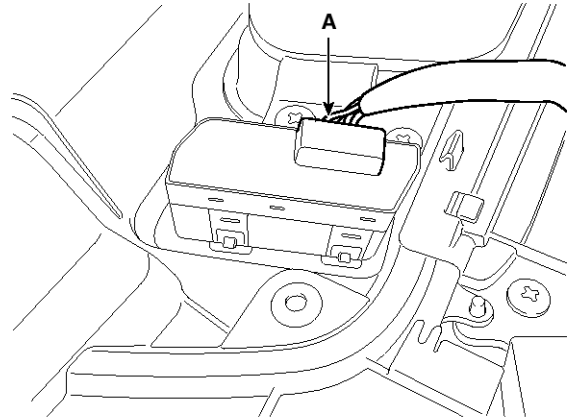
2. With the power IMS control switch in each position, make sure that continuity exists between the terminals below. If continuity is not as specified, replace the IMS control switch.

| Terminal<br>Position |   | 1   | 3 | 4 | 5 |
|----------------------|---|-----|---|---|---|
|                      |   | SET | ○ | ○ |   |
| Push<br>(ON)         | 1 | ○   |   | ○ |   |
|                      | 2 | ○   |   |   | ○ |

SVGBE0005L

## Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the front door trim panel.  
(Refer to the BD group - "Front door")
3. Remove the IMS switch connector (A) from door trim panel.



SVGB10084D

4. Remove the IMS control switch.

## Installation

### NOTICE

- Make sure that the IMS control switch connectors and related connectors are plugged in properly.
  - Check the IMS control switch operates normally.
1. Connect the connectors and reassemble the IMS control switch.
  2. Reassemble the front door trim panel.

# BE-294

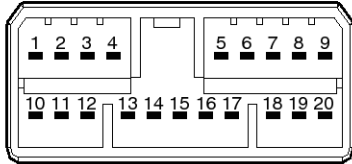
# Body Electrical System

## IMS Power Seat Control

### Circuit diagram

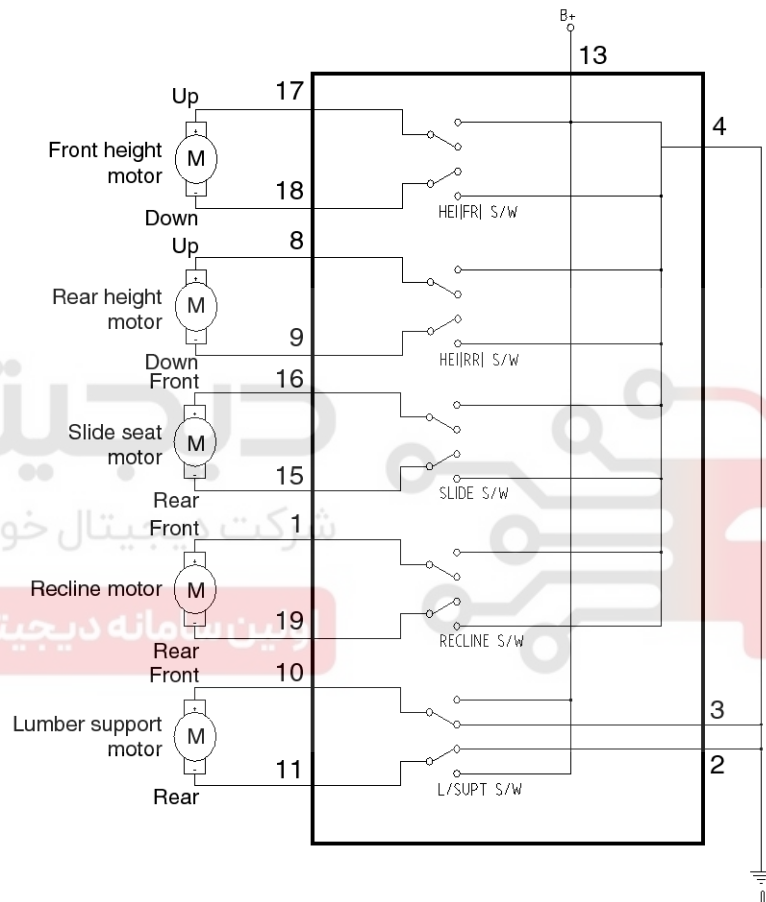
[IMS]

Power seat switch connector



Connector A

| Pin NO. | Connector name               |
|---------|------------------------------|
| 1       | Front recline motor          |
| 2       | Lumber support motor ground  |
| 3       | Lumber support motor ground  |
| 4       | Battery (-)                  |
| 5       | -                            |
| 6       | -                            |
| 7       | -                            |
| 8       | Rear height up motor         |
| 9       | Rear height down motor       |
| 10      | Lumber support motor (Front) |
| 11      | Lumber support motor (Rear)  |
| 12      | -                            |
| 13      | Battery (+)                  |
| 14      | -                            |
| 15      | Rear slide seat motor        |
| 16      | Front slide seat motor       |
| 17      | Front height up motor        |
| 18      | Front height down motor      |
| 19      | Rear recline motor           |
| 20      | -                            |



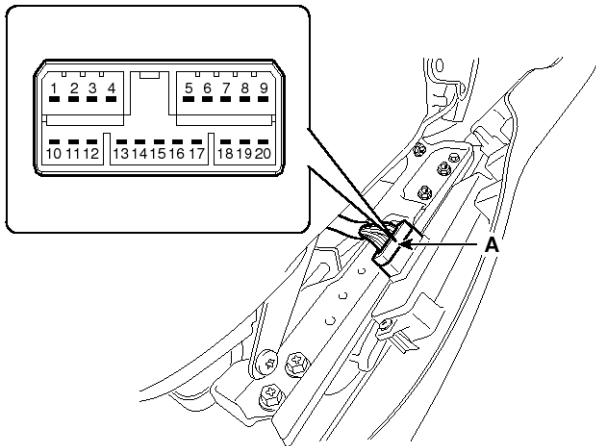
SYFBE0126L

# IMS (Integrated Memory)

# BE-295

## Inspection

1. Remove the IMS control switch connector (A).

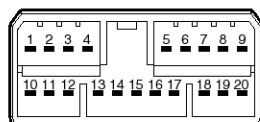


SVGBE0432D

2. With the IMS control switch in each position, make sure that continuity exists between the terminals below. If continuity is not as specified, replace the IMS control switch.

## Driver Power Seat Control Switch (For IMS)

|    | Front height control switch |      | Seat control switch |      |       |      | Rear height control switch |      | Recline control switch |     |       |      | Lumber support control switch |       |      | Remark                  |
|----|-----------------------------|------|---------------------|------|-------|------|----------------------------|------|------------------------|-----|-------|------|-------------------------------|-------|------|-------------------------|
|    | UP                          | Down | N                   |      | LH    |      | UP                         | Down | N                      |     | LH    |      | -                             | Front | Rear |                         |
|    |                             |      | HEI                 | SEAT | Front | Rear |                            |      | HEI                    | REC | Front | Rear |                               |       |      |                         |
| 9  |                             |      |                     |      |       |      |                            | ○    |                        | ○   |       |      |                               |       |      | Rear height down motor  |
| 8  |                             |      |                     |      |       |      | ○                          |      | ○                      | ○   |       |      |                               |       |      | Rear height up motor    |
| 13 |                             |      | ○                   | ○    | ○     | ○    |                            |      | ○                      | ○   |       |      |                               | ○     | ○    | ⊕                       |
| 4  | ○                           | ○    |                     |      |       |      | ○                          | ○    |                        |     | ○     | ○    |                               |       |      | GND ⊖                   |
| 1  |                             |      |                     |      |       |      |                            |      |                        | ○   |       |      |                               |       |      | Front recline motor     |
| 19 |                             |      |                     |      |       |      |                            |      |                        |     | ○     |      |                               |       |      | Rear recline motor      |
| 18 |                             | ○    |                     |      |       |      |                            |      |                        |     |       |      |                               |       |      | Front height down motor |
| 17 | ○                           |      |                     |      |       |      |                            |      |                        |     |       |      |                               |       |      | Front height up motor   |
| 15 |                             |      |                     |      |       | ○    |                            |      |                        |     |       |      |                               |       |      | Seat motor              |
| 16 |                             |      |                     |      | ○     | ○    |                            |      |                        |     |       |      |                               |       |      | Seat motor              |
| 10 |                             |      |                     |      |       |      |                            |      |                        |     |       |      | ○                             | ○     |      | Lumber motor (Front)    |
| 11 |                             |      |                     |      |       |      |                            |      |                        |     |       |      | ○                             | ○     |      | Lumber motor (Rear)     |
| 3  |                             |      |                     |      |       |      |                            |      |                        |     |       |      | ○                             | ○     |      | Lumber GND ⊖            |
| 2  |                             |      |                     |      |       |      |                            |      |                        |     |       |      | ○                             | ○     |      | Lumber GND ⊖            |



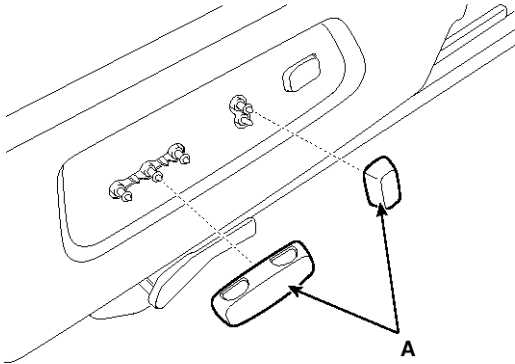
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## BE-296

## Body Electrical System

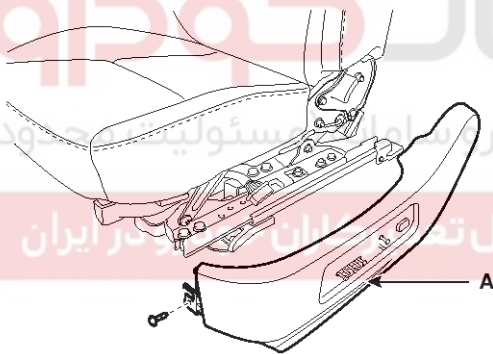
## Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the switch (A) from seat side cover.



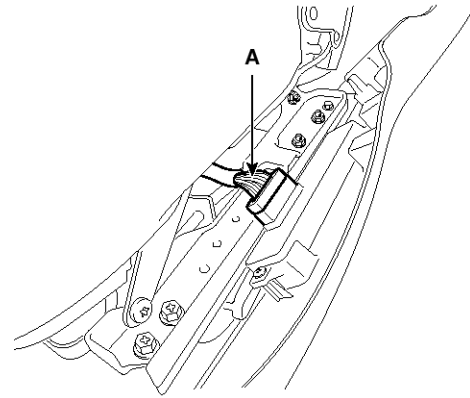
SVGBE0396D

3. Remove the seat side cover (A).  
(Refer to the BD group - "Front seat")



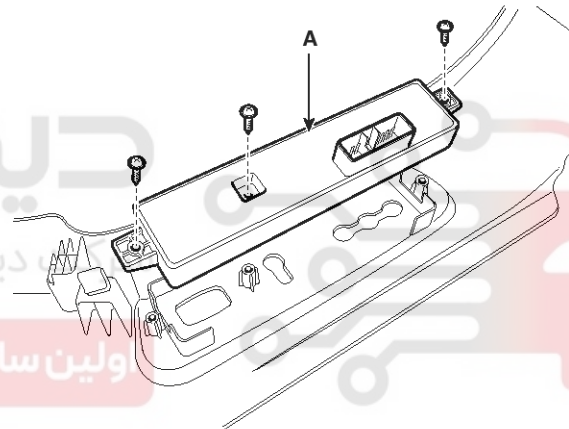
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4. Disconnect the IMS control switch connector (A).



SVGBE0395D

5. Loosen the IMS control switch (A) mounting screws (3EA).



SVGB10083D

## Installation

## NOTICE

- Make sure that the IMS control switch connectors and related connectors are plugged in properly.
- Check the IMS control switch operates normally.

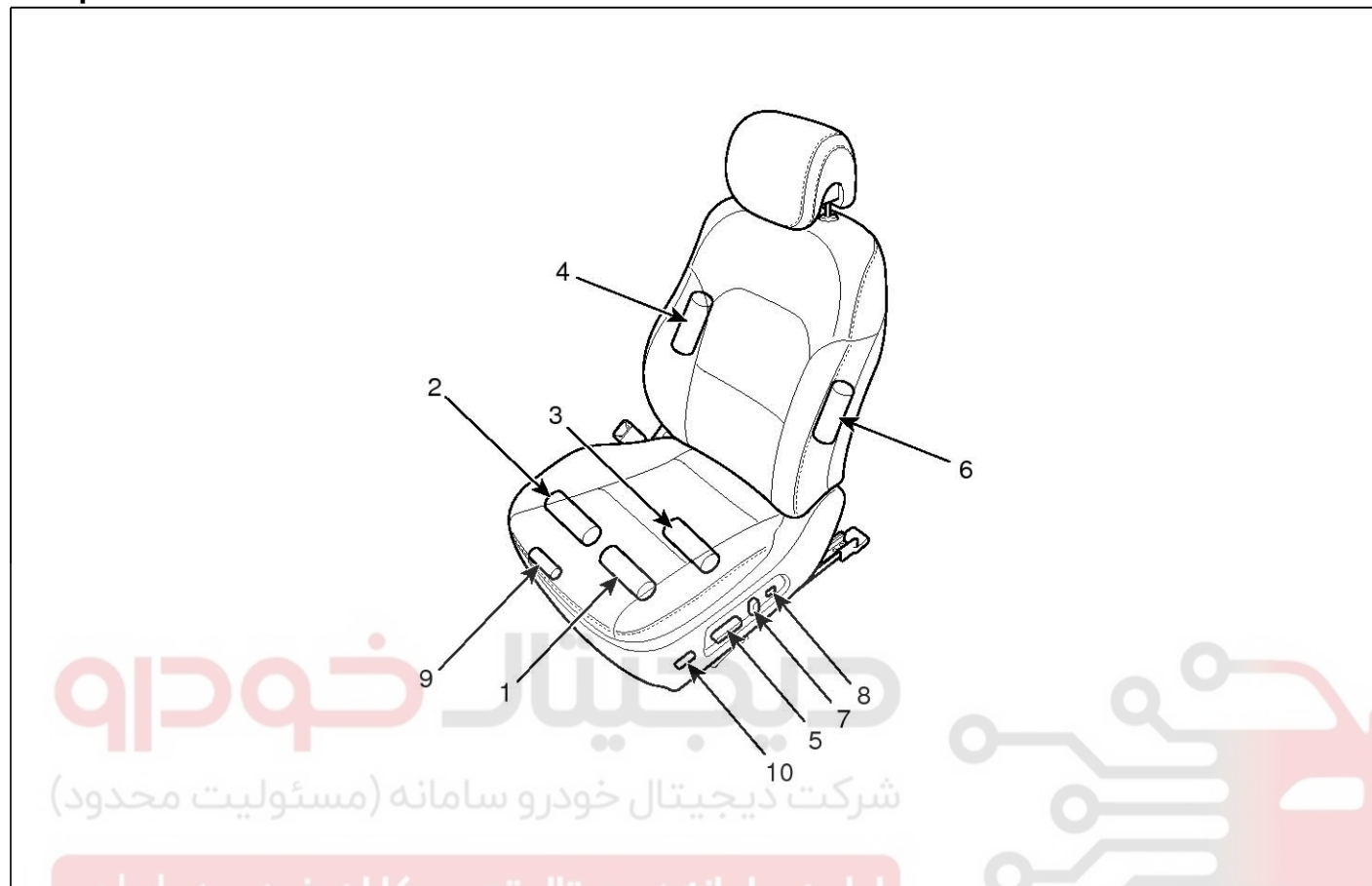
1. Connect the connectors and reassemble the IMS control switch.
2. Reassemble the seat side cover.

# Seat Electrical

# BE-297

## Seat Electrical

### Component Location



SVGBE0399D

- |                              |                              |
|------------------------------|------------------------------|
| 1. Slide motor               | 6. Recline motor             |
| 2. Front height motor        | 7. Recline control switch    |
| 3. Rear height motor         | 8. Lumbar support switch     |
| 4. Lumbar support motor      | 9. Cushion extension motor   |
| 5. Power seat control switch | 10. Cushion extension switch |

## BE-298

## Body Electrical System

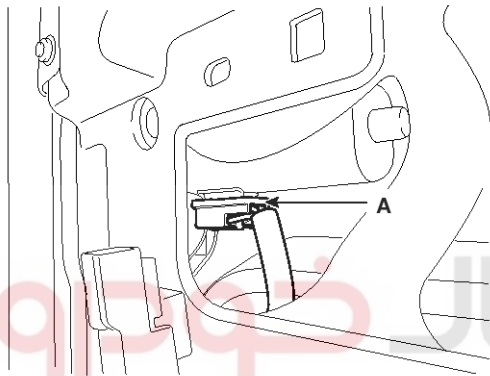
## Power Seat Motor

## Inspection

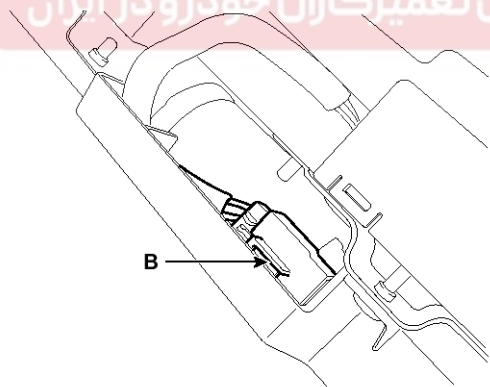
## Power Seat Motor

1. Disconnect the connectors for each motor.

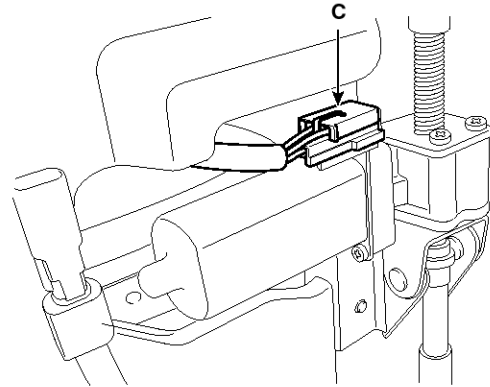
- A : Front height motor
- B : Slide motor
- C : Rear height motor
- D : Recline motor
- E : Lumber support motor
- F : Cushion extension motor



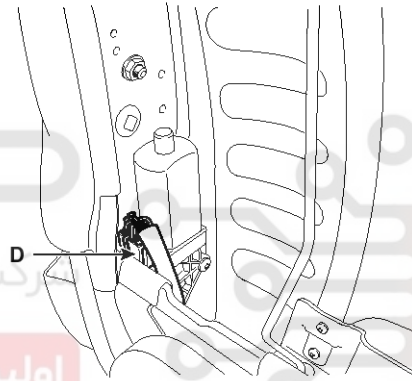
SVGBE0400D



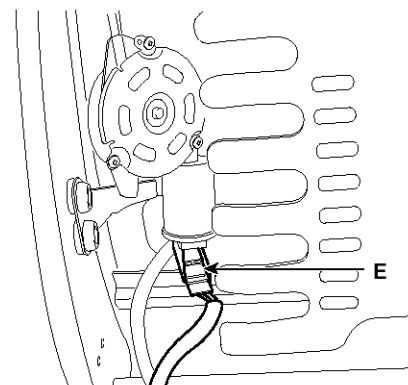
SVGBE0401D



SVGBE0402D



SVGBE0403D

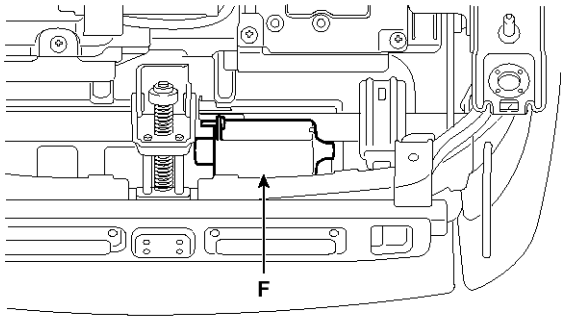


SVGBE0404D



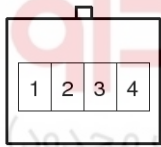
# Seat Electrical

# BE-299

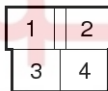


SVGB10087D

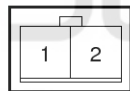
2. With the battery connected directly to the motor terminals, check if the motors run smoothly.
3. Reverse the connections and check that the motor turns in reverse.
4. If there is an abnormality, replace the motors.



[B]



[A, C, D]



[E, F]



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SVGB10068D

| Position             | Terminal NO. | +  | - |
|----------------------|--------------|----|---|
|                      |              | Up | 2 |
| Front height motor A | Down         | 1  | 2 |
|                      | Front        | 1  | 4 |
| Slide motor B        | Rear         | 4  | 1 |
|                      | Up           | 1  | 4 |
| Rear height motor C  | Down         | 4  | 1 |
|                      | Front        | 2  | 1 |
| Recline motor D      | Rear         | 1  | 2 |
|                      | Front        | 1  | 2 |
| Lumber support E     | Rear         | 2  | 1 |
|                      | Front        | 1  | 2 |
| Cushion extension F  | Rear         | 2  | 1 |

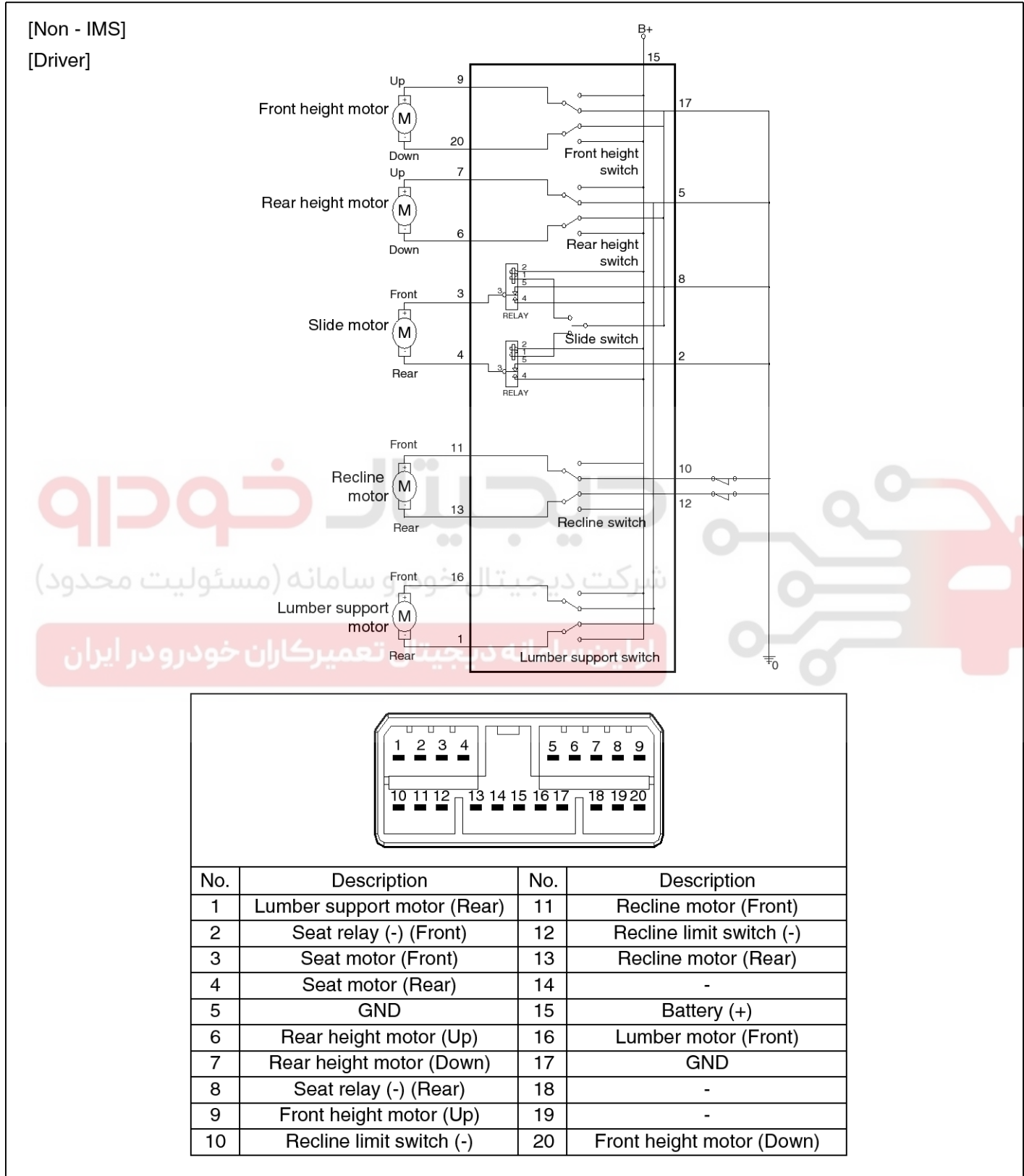
SVGBE0006L

BE-300

Body Electrical System

Power Seat Control Switch

Circuit Diagram

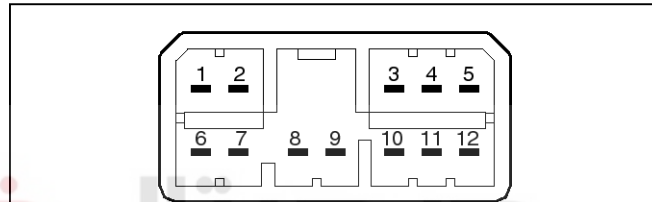
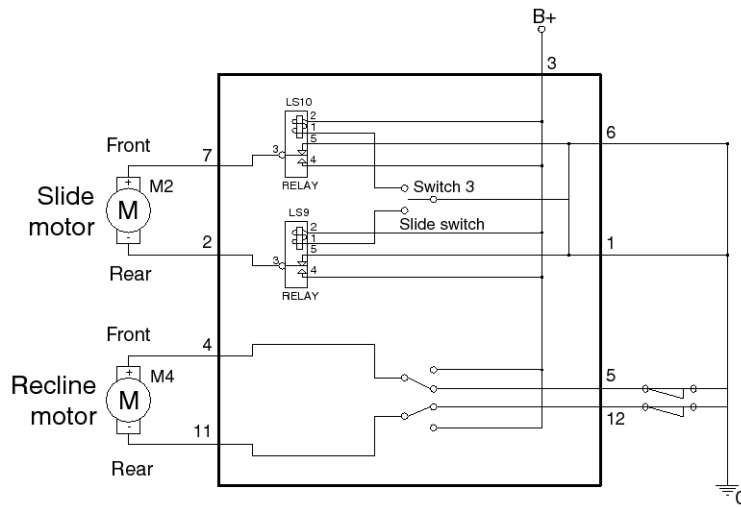


SYFBE0132L

# Seat Electrical

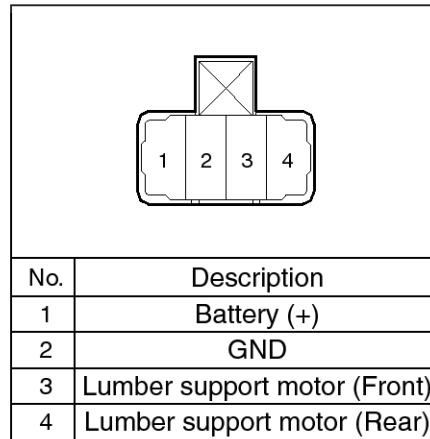
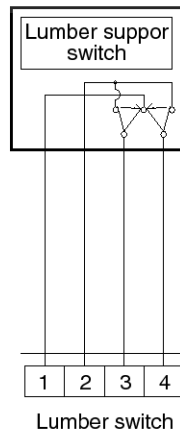
# BE-301

[Non - IMS]  
[Passenger]



| No. | Description              | No. | Description              |
|-----|--------------------------|-----|--------------------------|
| 1   | Seat relay (-)           | 7   | Seat motor (Front)       |
| 2   | Seat motor (Rear)        | 8   | -                        |
| 3   | Battery (+)              | 9   | -                        |
| 4   | Recline motor (Front)    | 10  | -                        |
| 5   | Recline limit switch (-) | 11  | Recline motor (Rear)     |
| 6   | Seat relay GND (-)       | 12  | Recline limit switch (-) |

[Lumber Support]



SYFBE0133L

# BE-302

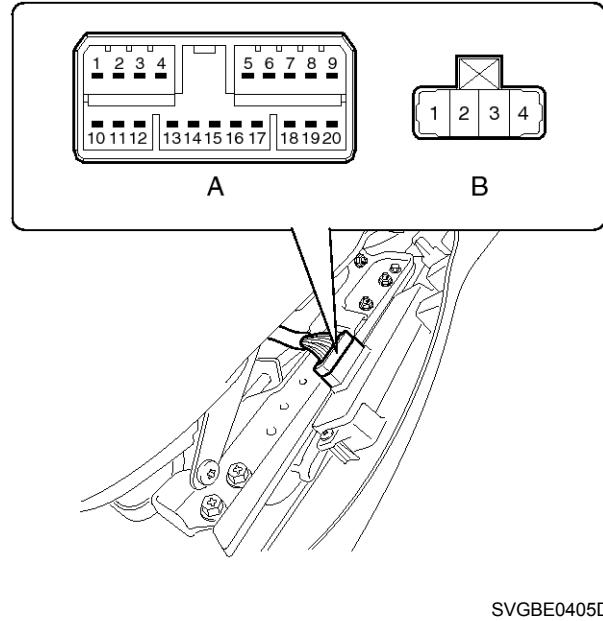
# Body Electrical System

## Inspection

With the power seat switch in each position, make sure that continuity exists between the terminals below. If continuity is not as specified, replace the power seat switch.

A : Power seat control switch

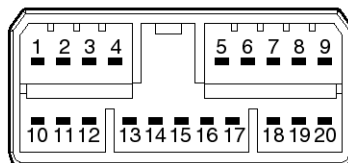
B : Lumber support switch



SVGBE0405D

## Driver power seat control switch (Non - IMS)

| Terminal | Front height control switch |      | Slide control switch |      |       |      | Rear height control switch |      | Rear recline control switch |     |       |      | Lumber support control switch |       |      | Remark                       |
|----------|-----------------------------|------|----------------------|------|-------|------|----------------------------|------|-----------------------------|-----|-------|------|-------------------------------|-------|------|------------------------------|
|          | Up                          | Down | N                    |      | LH    |      | Up                         | Down | N                           |     | LH    |      | -                             | Front | Rear |                              |
|          |                             |      | HEI                  | SEAT | Front | Rear |                            |      | HEI                         | REC | Front | Rear |                               |       |      |                              |
| 15       | ○                           | ○    |                      |      | ○     | ○    | ○                          | ○    |                             |     | ○     | ○    |                               | ○     | ○    | Battery ⊕                    |
| 17       | ○                           | ○    | ○                    | ○    |       |      |                            |      |                             |     |       |      |                               |       |      | GND ⊖                        |
| 20       | ○                           | ○    | ○                    | ○    |       |      |                            |      |                             |     |       |      |                               |       |      | Front height motor           |
| 9        | ○                           | ○    | ○                    | ○    |       |      |                            |      |                             |     |       |      |                               |       |      | Front height motor           |
| 4        |                             |      |                      | ○    |       | ○    |                            |      |                             |     |       |      |                               |       |      | Seat motor                   |
| 3        |                             |      |                      | ○    |       | ○    |                            |      |                             |     |       |      |                               |       |      | Seat motor                   |
| 8        |                             |      |                      | ○    |       | ○    |                            |      |                             |     |       |      |                               |       |      | Seat relay GND ⊖             |
| 2        |                             |      |                      | ○    |       | ○    |                            |      |                             |     |       |      |                               |       |      | Seat relay GND ⊖             |
| 7        |                             |      |                      |      |       |      | ○                          |      | ○                           |     |       |      |                               |       |      | Rear height motor (Up)       |
| 6        |                             |      |                      |      |       |      |                            | ○    | ○                           |     |       |      |                               |       |      | Rear height motor (Down)     |
| 11       |                             |      |                      |      |       |      |                            |      |                             | ○   |       | ○    |                               |       |      | Recline motor (Front)        |
| 13       |                             |      |                      |      |       |      |                            |      |                             |     | ○     | ○    |                               |       |      | Recline motor (Rear)         |
| 12       |                             |      |                      |      |       |      |                            |      |                             |     | ○     | ○    |                               |       |      | Recline limit switch ⊖       |
| 10       |                             |      |                      |      |       |      |                            |      |                             |     | ○     | ○    |                               |       |      | Recline limit switch ⊖       |
| 1        |                             |      |                      |      |       |      |                            |      |                             |     |       |      | ○                             |       | ○    | Lumber support motor (Rear)  |
| 16       |                             |      |                      |      |       |      |                            |      |                             |     |       |      | ○                             | ○     |      | Lumber support motor (Front) |
| 5        |                             |      |                      |      |       |      |                            |      |                             |     |       |      | ○                             | ○     |      | Lumber GND ⊖                 |



[Driver power seat control switch]

SYFBE0134L

## NOTICE

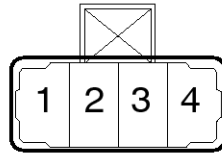
In case of IMS switch inspection, refer to "IMS" system.

# Seat Electrical

# BE-303

## Driver Lumber Switch

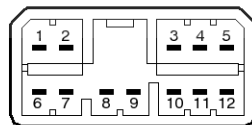
|   | Lumber switch |         |       | Remark |
|---|---------------|---------|-------|--------|
|   | Rear          | Neutral | Front |        |
| 1 | ○             |         | ○     |        |
| 2 |               | ○ ○     |       |        |
| 3 |               | ○       | ○     |        |
| 4 | ○             | ○       |       |        |



SYFBE0135L

## Passenger power seat control switch

|    | Slide control switch |       |      | Rear recline control switch |      | Remark                 |     |
|----|----------------------|-------|------|-----------------------------|------|------------------------|-----|
|    | N                    | RH    |      | RH                          |      |                        | N   |
|    | SEAT                 | Front | Rear | Front                       | Rear |                        | REC |
| 3  |                      | ○     | ○    | ○                           | ○    | Battery ⊕              |     |
| 7  | ○                    | ○     |      |                             |      | Seat motor (Front)     |     |
| 2  | ○                    |       | ○    |                             |      | Seat motor (Rear)      |     |
| 4  |                      |       |      | ○                           |      | Recline motor (Front)  |     |
| 11 |                      |       |      |                             | ○    | Recline motor (Rear)   |     |
| 6  | ○                    |       |      |                             |      | Seat relay GND ⊖       |     |
| 1  | ○                    |       |      |                             |      | Seat relay GND ⊖       |     |
| 5  |                      |       |      |                             | ○    | Recline limit switch ⊖ |     |
| 12 |                      |       |      |                             | ○    | Recline limit switch ⊖ |     |



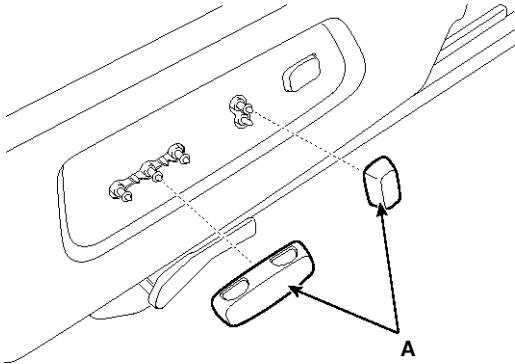
SYFBE0136L

## BE-304

## Body Electrical System

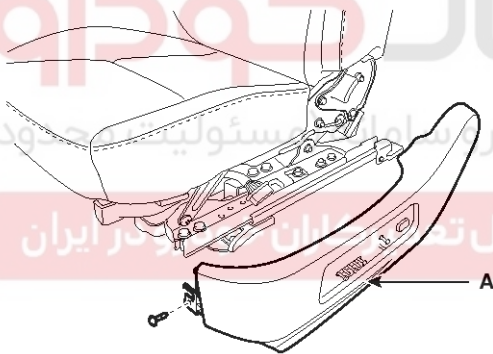
## Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the switches (A) from seat side cover.



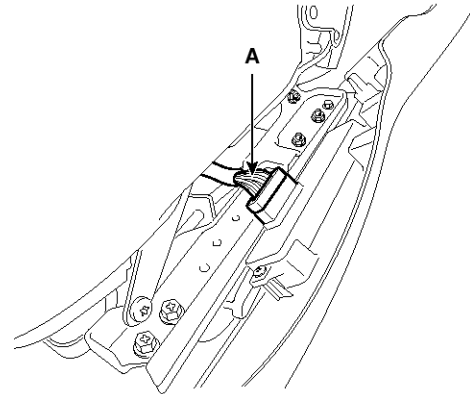
SVGBE0396D

3. Remove the seat side cover (A).  
(Refer to the BD group - "Front seat")



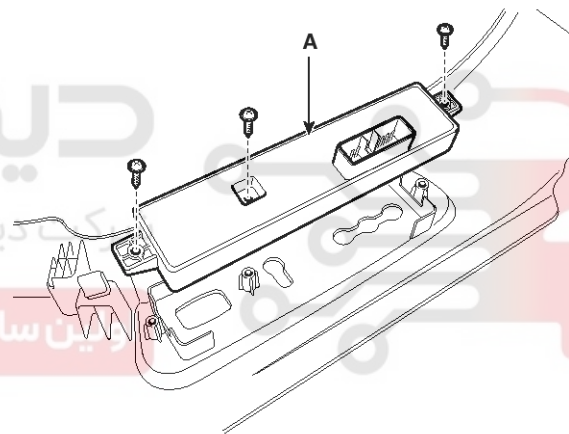
SVGBE0431D

4. Disconnect the power seat control switch connector (A).



SVGBE0395D

5. Loosen the power seat control switch (A) mounting screws (3EA).



SVGB10083D

## Installation

## NOTICE

- Make sure that the IMS control switch connectors and related connectors are plugged in properly.
- Check the IMS control switch operates normally.

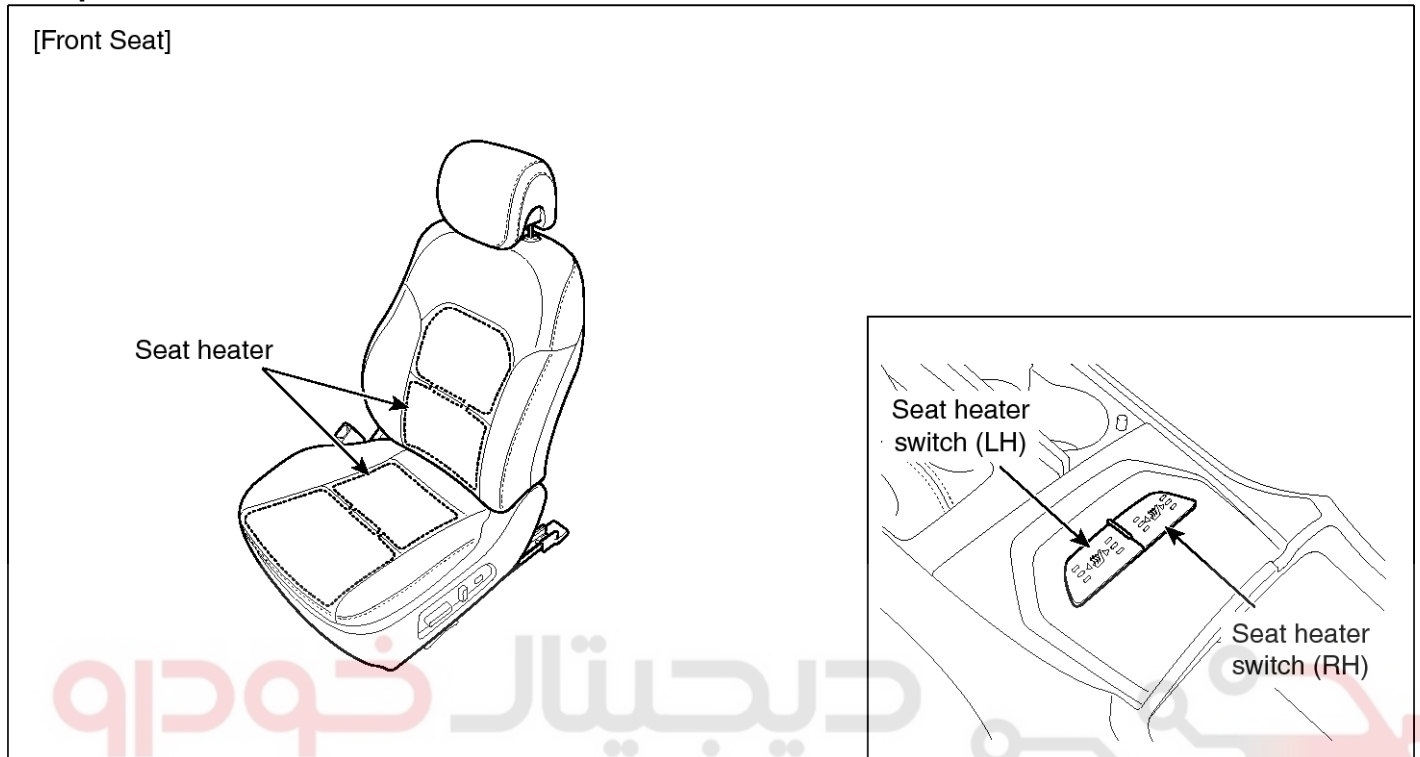
1. Connect the connectors and reassemble the IMS control switch.
2. Reassemble the seat side cover.

# Seat Electrical

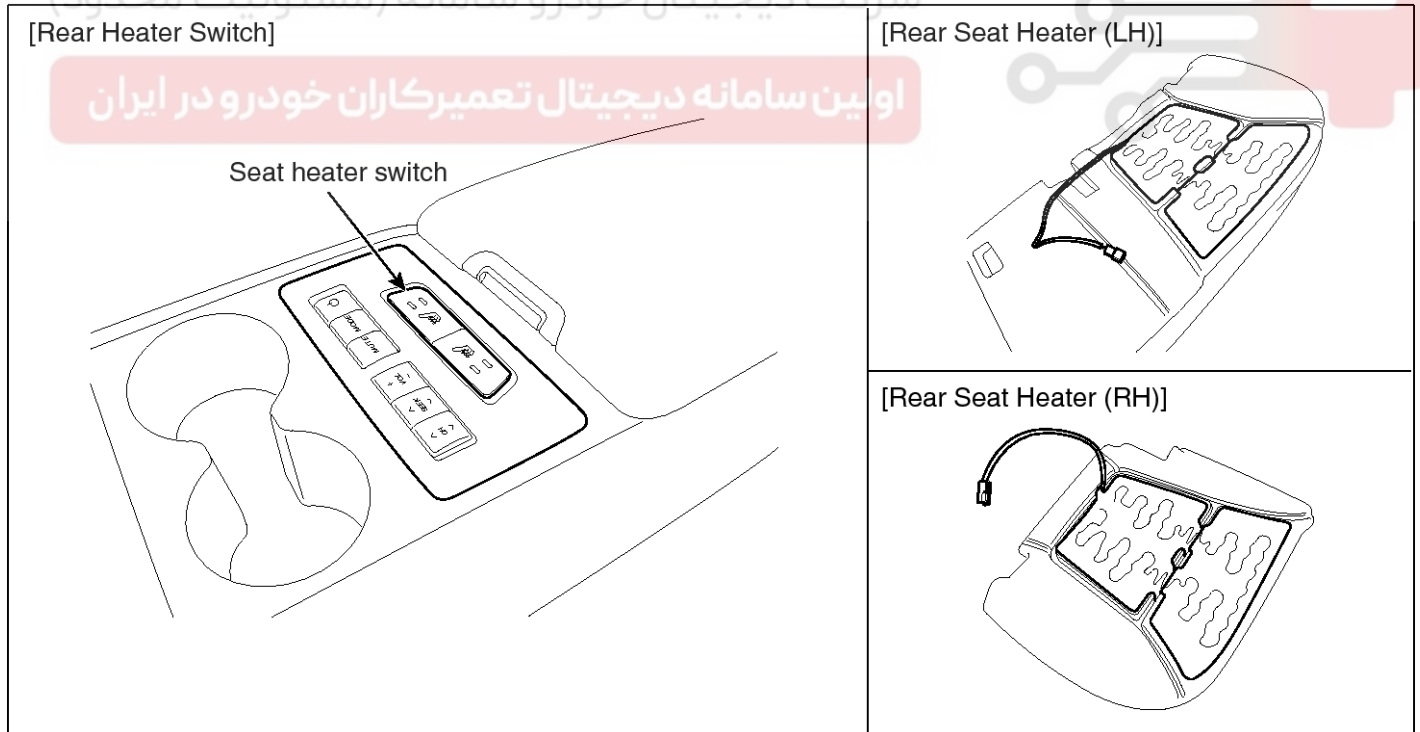
# BE-305

## Seat Heater

### Component Location



SVGBE0007L



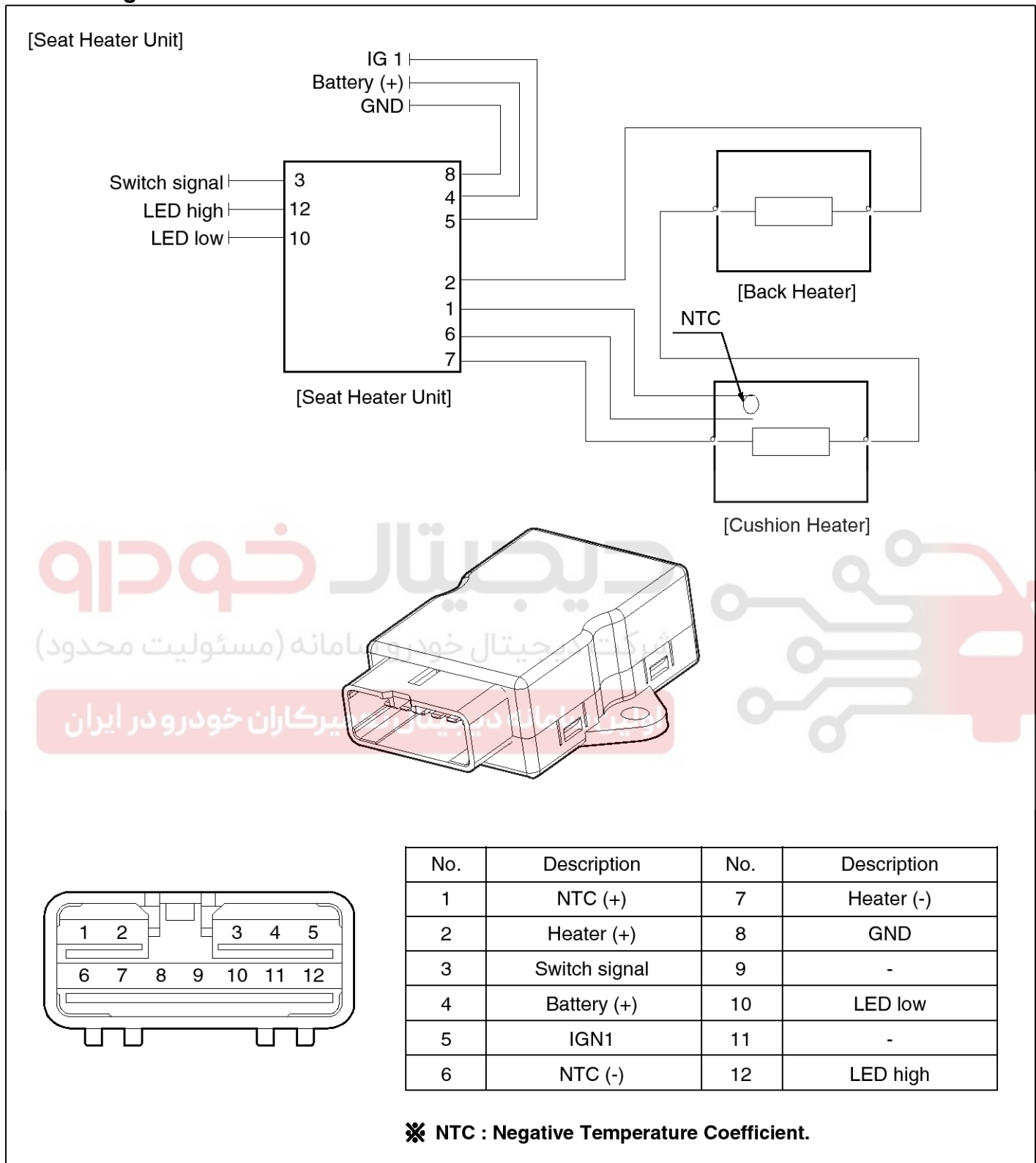
SVGBE0008L



# BE-306

# Body Electrical System

## Circuit Diagram

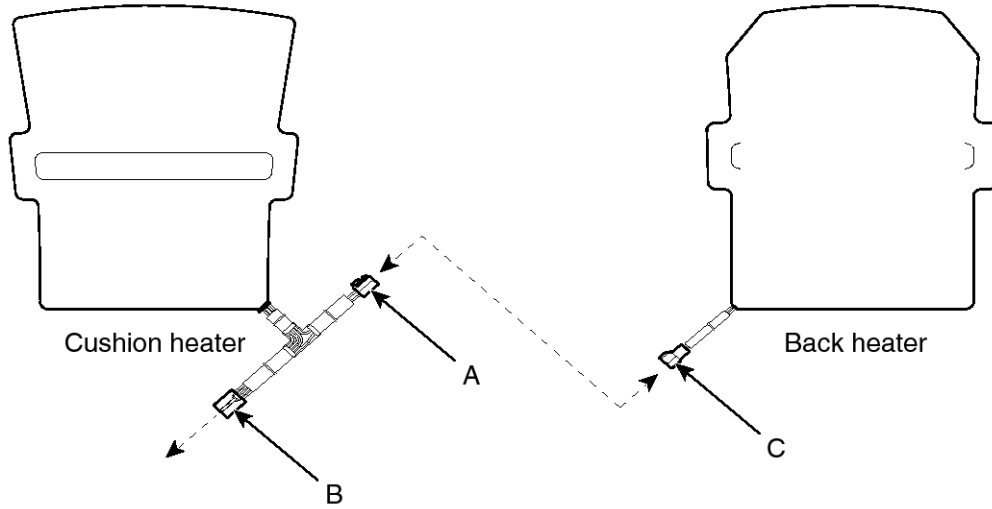


SVGBE0009L

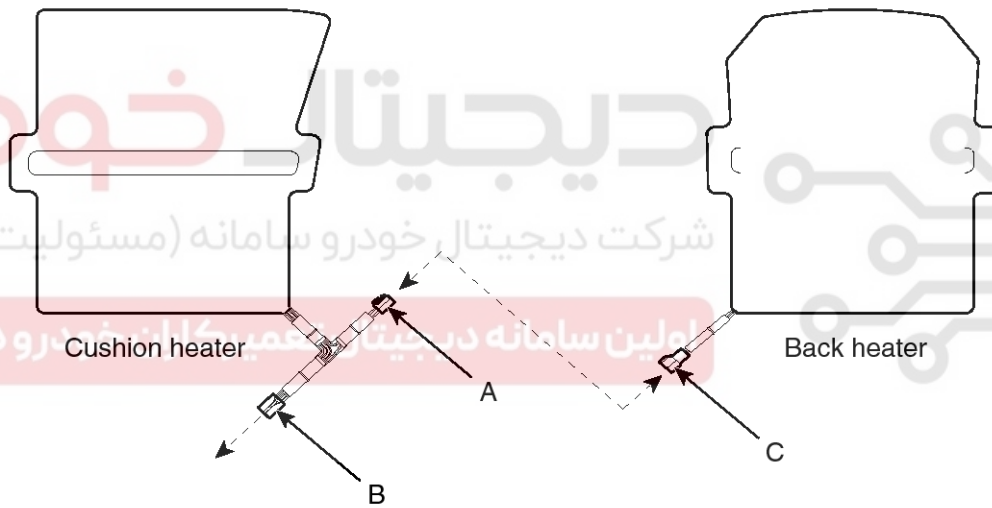
# Seat Electrical

# BE-307

[Front Seat Heater]



[Rear Seat Heater]



| Connector A | Connector B | Connector C |
|-------------|-------------|-------------|
|             |             |             |

SVGBE0010L

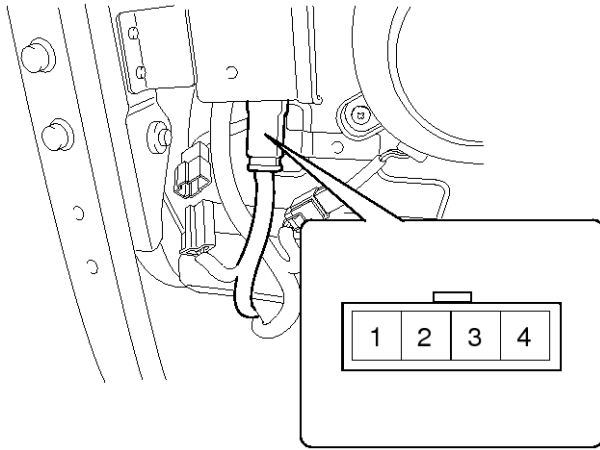
# BE-308

# Body Electrical System

## Inspection

### First Seat Heater

1. Check for continuity and measure the resistance between No.1 and NO.4 terminals.



SVGBE0408D

| No. | Description | No. | Description |
|-----|-------------|-----|-------------|
| 1   | Heater (-)  | 3   | NTC (+)     |
| 2   | NTC (-)     | 4   | Heater (+)  |

#### Standard value (Fabric / Leather)

**Cushion :**  $1.04 \Omega \pm 10\%$

**Back :**  $1.1 \Omega \pm 10\%$

**Set :**  $2.14 \Omega \pm 10\%$

2. Operate the seat heater after connecting the connector, and then check the thermostat by measuring the temperature of seat surface.

#### Standard value (Fabric / Leather)

##### Cushion :

1 Step :  $40 \pm 2^\circ\text{C}(104 \pm 3.6^\circ\text{F})$

2 Step :  $42 \pm 2^\circ\text{C}(107.6 \pm 3.6^\circ\text{F})$

##### Back :

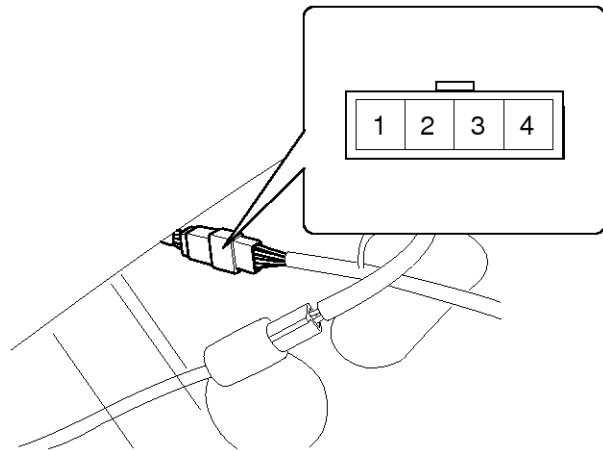
1 Step :  $46 \pm 2^\circ\text{C}(114.8 \pm 3.6^\circ\text{F})$

2 Step :  $52 \pm 2^\circ\text{C}(125.6 \pm 3.6^\circ\text{F})$

3. Check for continuity between the terminals after disconnecting the connector.

### 2nd Seat Heater

1. Check for continuity and measure the resistance between No.1 and NO.4 terminals.



SVGBE0410D

| No. | Description | No. | Description |
|-----|-------------|-----|-------------|
| 1   | Heater (-)  | 3   | NTC (+)     |
| 2   | NTC (-)     | 4   | Heater (+)  |

#### Standard value (Fabric / Leather)

**Cushion :**  $1.16 \Omega \pm 10\%$

**Back :**  $1.16 \Omega \pm 10\%$

**Set :**  $2.32 \Omega \pm 10\%$

2. Operate the seat warmer after connecting the 3P connector, and then check the thermostat by measuring the temperature of seat surface.

#### Standard value (Fabric / Leather)

##### Cushion :

1 Step :  $40 \pm 2^\circ\text{C}(104 \pm 3.6^\circ\text{F})$

2 Step :  $42 \pm 2^\circ\text{C}(107.6 \pm 3.6^\circ\text{F})$

##### Back :

1 Step :  $46 \pm 2^\circ\text{C}(114.8 \pm 3.6^\circ\text{F})$

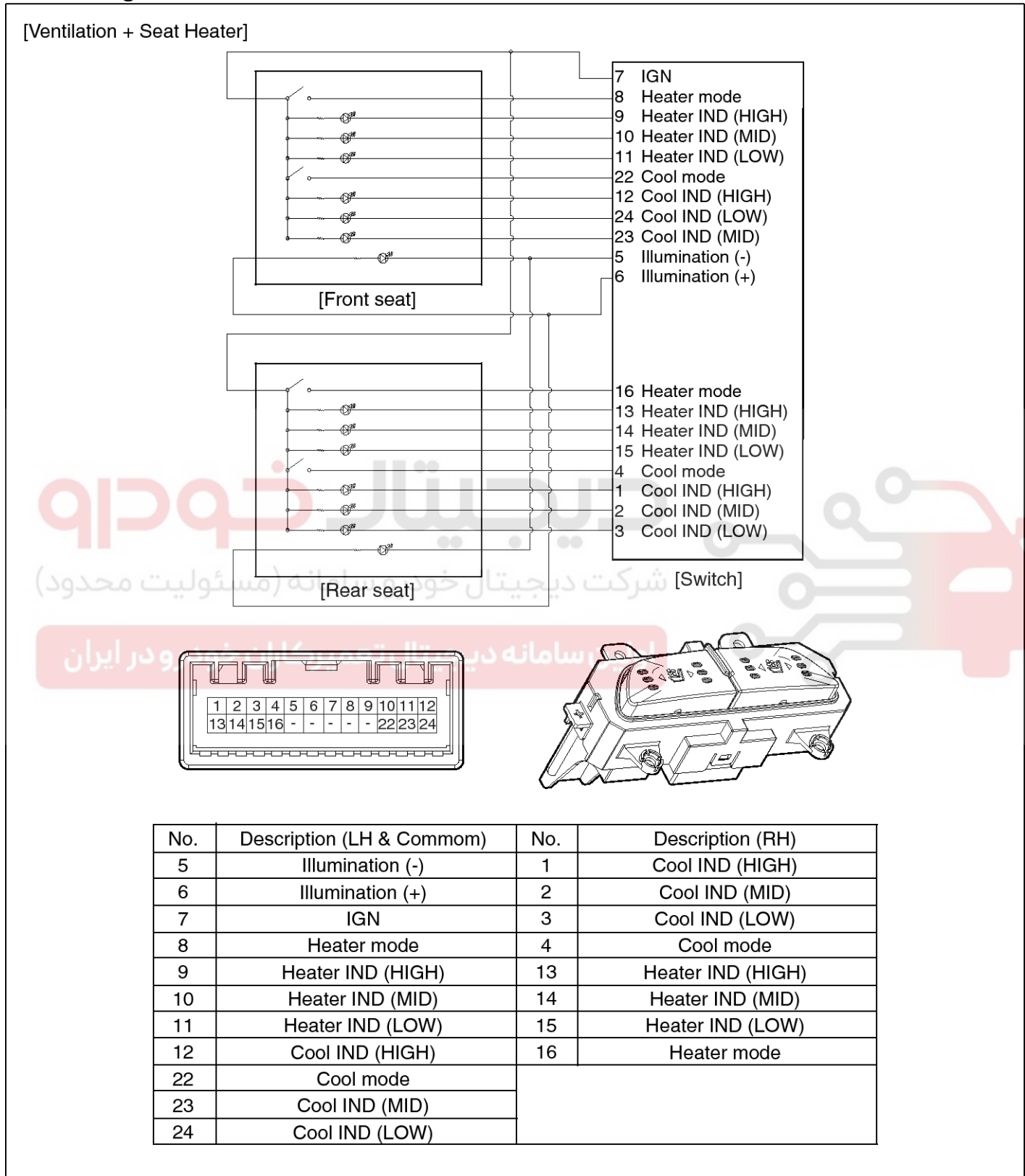
2 Step :  $52 \pm 2^\circ\text{C}(125.6 \pm 3.6^\circ\text{F})$

# Seat Electrical

# BE-309

## Seat Heater Switch

### Circuit Diagram

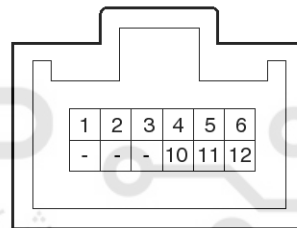
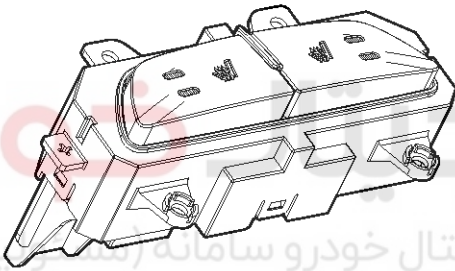
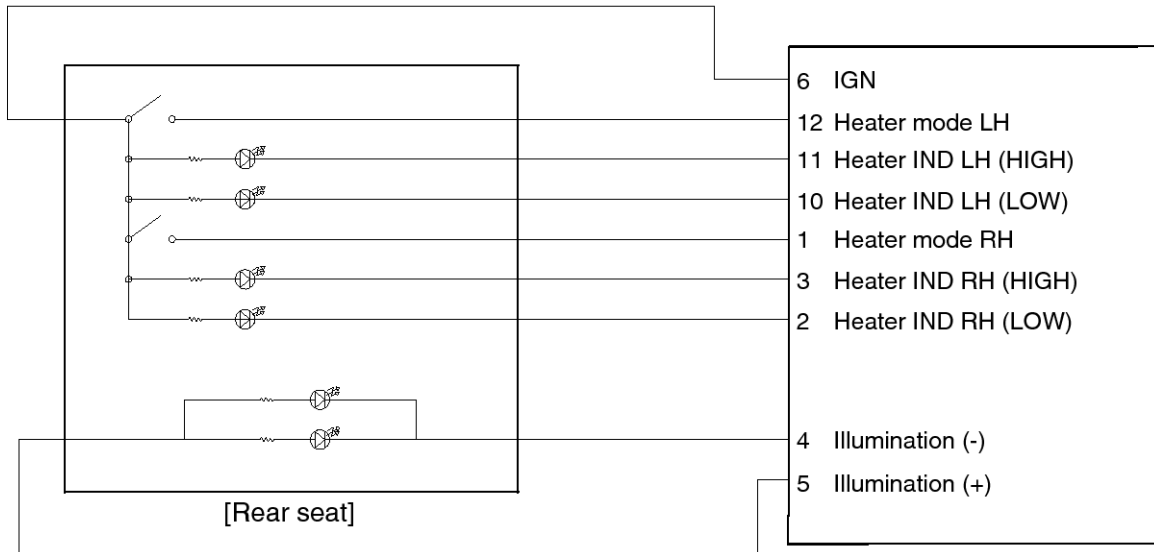


SVGBE0011L

BE-310

Body Electrical System

[Seat Heater]



شرکت دیجیتال خودرو سامانه (تولیدی و خدماتی) محدود

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| No. | Description          |
|-----|----------------------|
| 1   | Heater mode RH       |
| 2   | Heater IND RH (LOW)  |
| 3   | Heater IND RH (HIGH) |
| 4   | Illumination (-)     |
| 5   | Illumination (+)     |
| 6   | IGN                  |
| 7   | -                    |
| 8   | -                    |
| 9   | -                    |
| 10  | Heater IND LH (LOW)  |
| 11  | Heater IND LH (HIGH) |
| 12  | Heater mode LH       |

SVGBE0012L

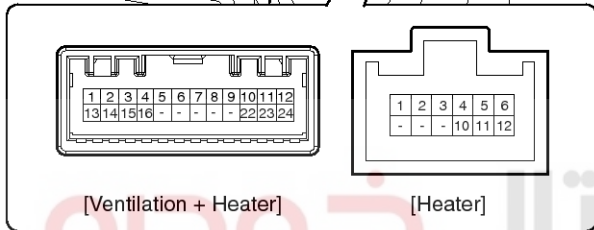
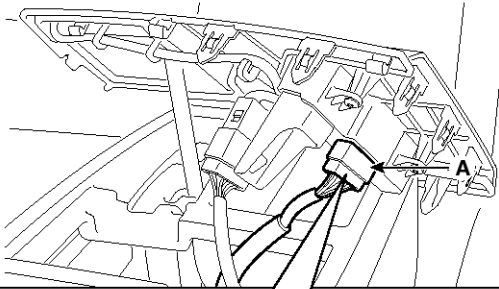
# Seat Electrical

# BE-311

## Inspection

### Front Seat Heater Switch

1. Disconnect the negative (-) battery terminal.
2. Remove the floor console upper cover (A).  
(Refer to BD group - "Console")
3. Remove the seat heater switch connector (A) from the floor console upper cover.



SVGBE0013L

4. Operate each seat heater switch and check that continuity exists between the terminals.

If there is no continuity, replace the seat heater switch

### [Ventilation + Heater]

( ) : Assist

| Position<br>Terminal | Driver | Assist | Remarks           |
|----------------------|--------|--------|-------------------|
| 7                    |        |        | IGN               |
| 8 (16)               |        |        | Heat mode         |
| 9 (13)               |        |        | Heater IND (HIGH) |
| 10 (14)              |        |        | Heater IND (MID)  |
| 11 (15)              |        |        | Heater IND (LOW)  |
| 5                    |        |        | Illumination (-)  |
| 6                    |        |        | Illumination (+)  |

SVGBE0014L

### [Ventilation + Heater]

( ) : Assist

| Position<br>Terminal | Driver | Assist | Remarks          |
|----------------------|--------|--------|------------------|
| 7                    |        |        | IGN              |
| 22 (4)               |        |        | Cool mode        |
| 12 (1)               |        |        | Cool IND (HIGH)  |
| 24 (2)               |        |        | Cool IND (MID)   |
| 23 (3)               |        |        | Cool IND (LOW)   |
| 5                    |        |        | Illumination (-) |
| 6                    |        |        | Illumination (+) |

SVGBE0026L

### [Heater]

| Position<br>Terminal | Right seat | Left seat | Remarks           |
|----------------------|------------|-----------|-------------------|
| 6                    |            |           | IGN               |
| 12                   |            |           | Heat mode         |
| 11                   |            |           | Heater IND (HIGH) |
| 10                   |            |           | Heater IND (MID)  |
| 1                    |            |           | Heat mode         |
| 3                    |            |           | Heater IND (HIGH) |
| 2                    |            |           | Heater IND (MID)  |
| 4                    |            |           | Illumination (-)  |
| 5                    |            |           | Illumination (+)  |

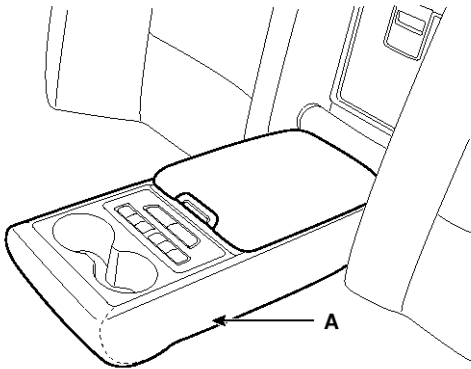
SVGBE0027L

# BE-312

# Body Electrical System

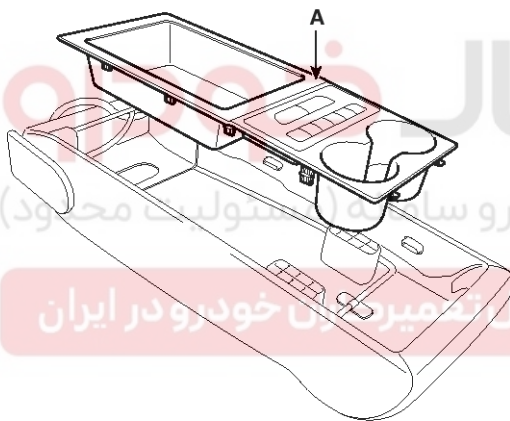
## Rear Seat Heater Switch

1. Disconnect the negative (-) battery terminal.
2. Open the rear seat arm rest (A).



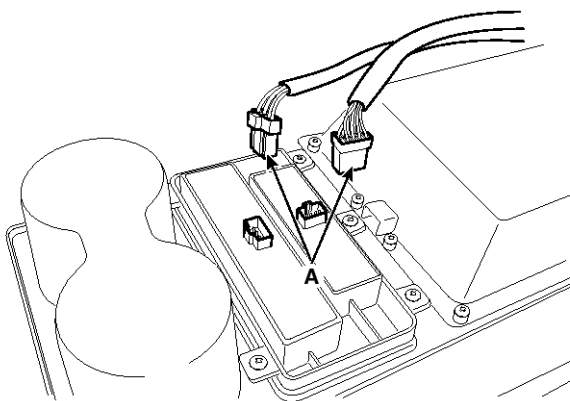
SVGBE0415D

3. Remove the rear seat arm rest upper cover (A).



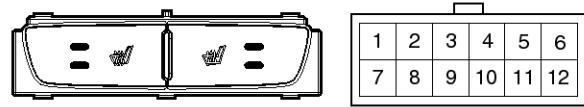
SVGBE0416D

4. Disconnect the connector (A).



SVGBE0417D

5. Turn rear seat heater switch ON and check that continuity exists between the terminals.

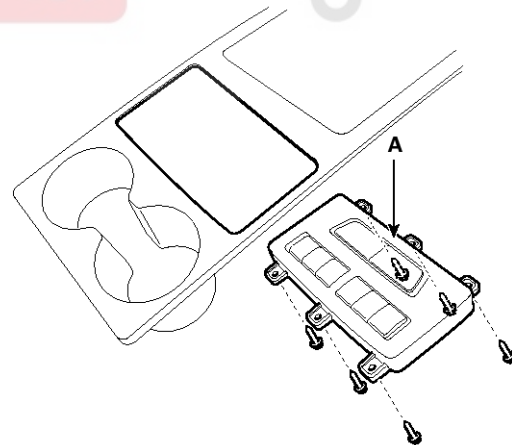


SVGB10160D

| Position Terminal | Left seat | Right seat | Remarks           |
|-------------------|-----------|------------|-------------------|
| 3                 | ○         | ○          | IGN               |
| 6                 | ○         | ○          | Signal (Left)     |
| 5                 | ○         | ○          | Heater IND (LOW)  |
| 4                 | ○         | ○          | Heater IND (HIGH) |
| 7                 |           | ○          | Signal (Right)    |
| 8                 |           | ○          | Heater IND (LOW)  |
| 9                 |           | ○          | Heater IND (HIGH) |
| 2                 | ○         | ○          | Illumination (-)  |
| 1                 | ○         | ○          | Illumination (+)  |

SVGBE0058L

6. If there is no continuity, replace the seat heater switch (A).



SVGBE0418D

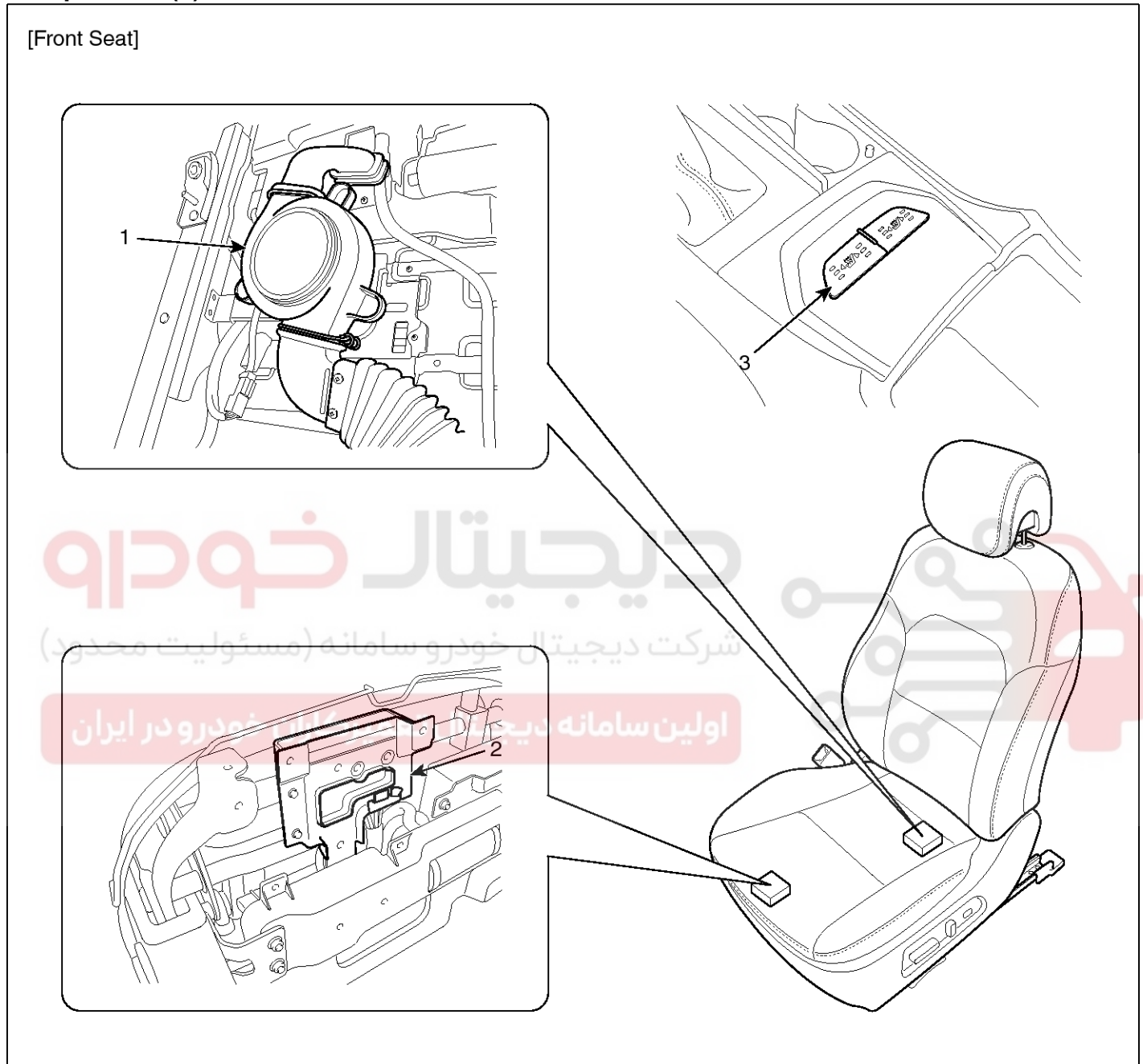


# Seat Electrical

# BE-313

## Air Ventilation Seat

### Components (1)



SVGBE0387L

- 1. Ventilation blower
- 2. Ventilation ECU

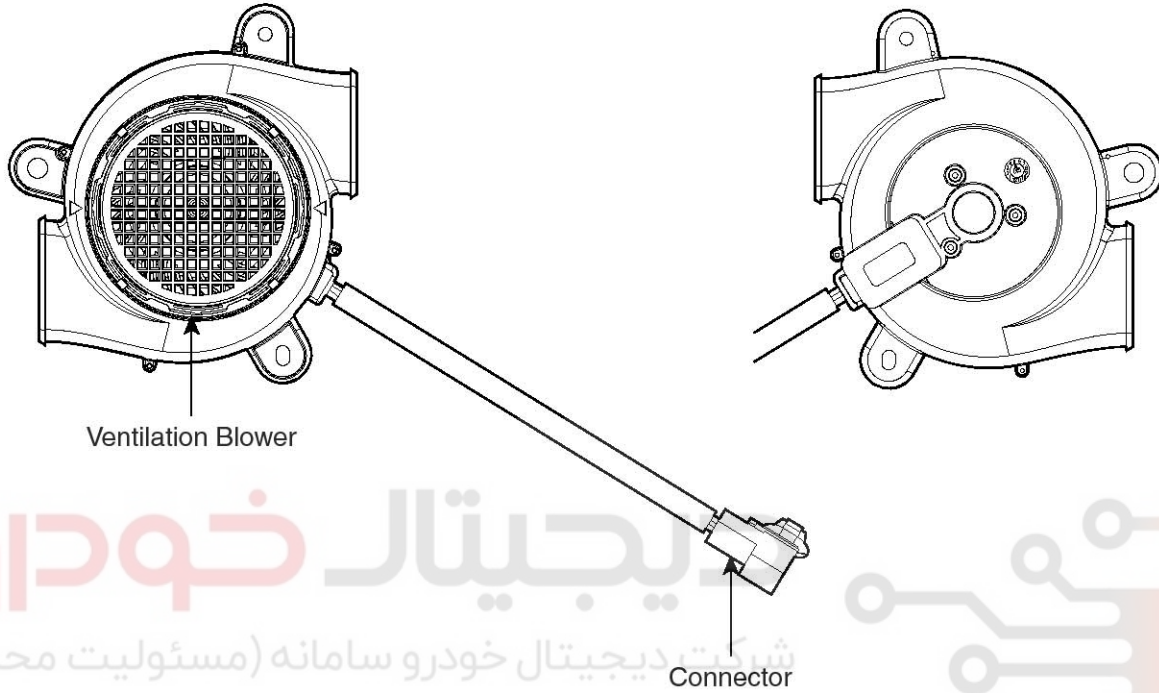
- 3. Ventilation seat switch

# BE-314

# Body Electrical System

## Components (2)

[Ventilation Blower]



اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

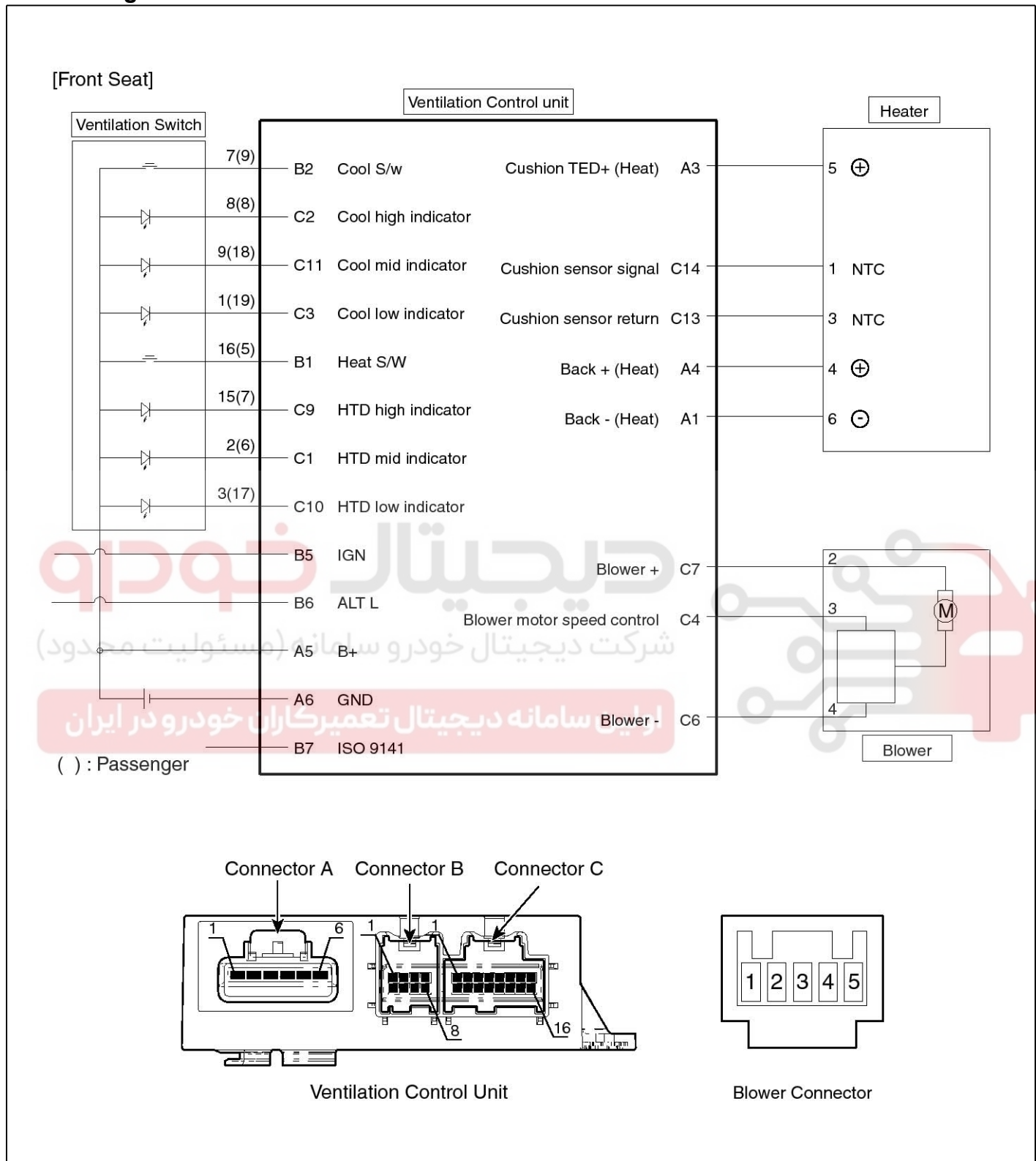
| Connector | Pin | Description |
|-----------|-----|-------------|
|           | 1   | -           |
|           | 2   | 12V         |
|           | 3   | RPM Control |
|           | 4   | Ground      |
|           | 5   | -           |

SHMBE0002L

# Seat Electrical

# BE-315

## Circuit Diagram



SVGBE0388L

## BE-316

## Body Electrical System

### Description

Using the blows power of FAN on seat, remove the moisture, sweat and warmth from occupants and surface of seats.

It inhales the indoor air through the blower installed at the seat cushion lower part, and supplies the air into the seat cushion and the seat back through the duct.

It sends a slight air throughout the seat surface through the air channel set up at seat cushion and seat back.

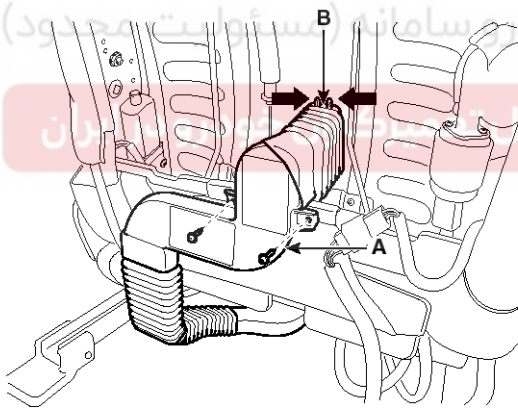
### NOTICE

1. Make sure not to spoil drink or water on the seat when equipping with ventilation system seat
2. Because of inhaling the slight air, it is difficult to feel the air strength by the sense of touch.

### Removal

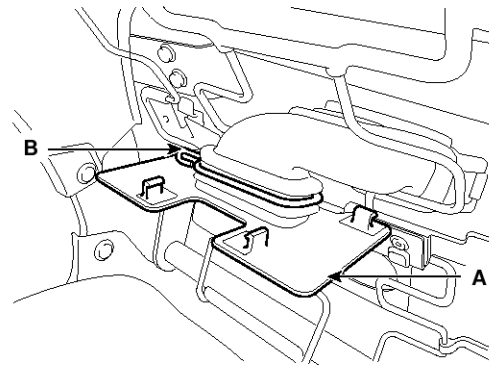
#### [Front Seat]

1. Remove the front seat assembly.  
(Refer to Body group - "Front Seat")
2. Remove the seat back cover and cushion cover.  
(Refer to Body group - "Front Seat")
3. Remove the ventilation duct (A) after loosening screws and removing fixing hook (B).

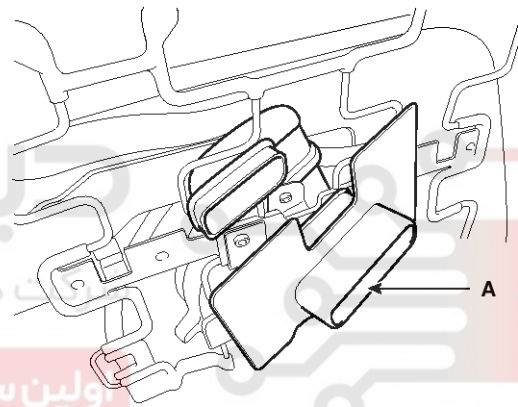


SVGBD0213D

4. Remove the air ventilation panel (A) and fixing clip (B) from seat cushion.



SVGBE0421D

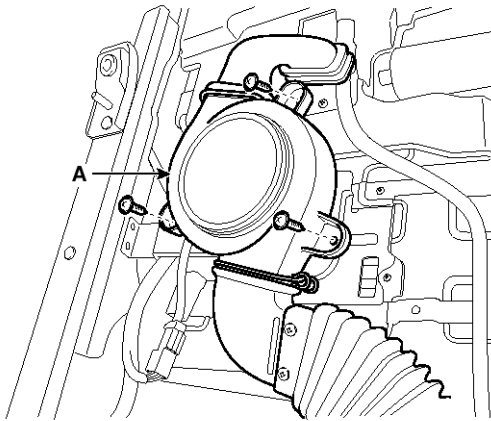


SVGBE0425D

# Seat Electrical

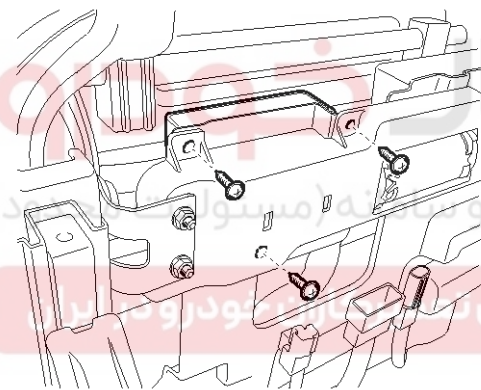
# BE-317

5. Remove the climate blower and duct (A) after loosening the fixing clips and screws.

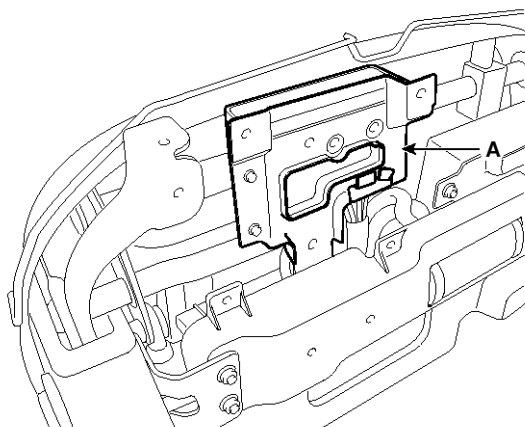


SVGBE0426D

6. Remove the climate control unit (A) after loosening the mounting screws.



SVGBE0422D

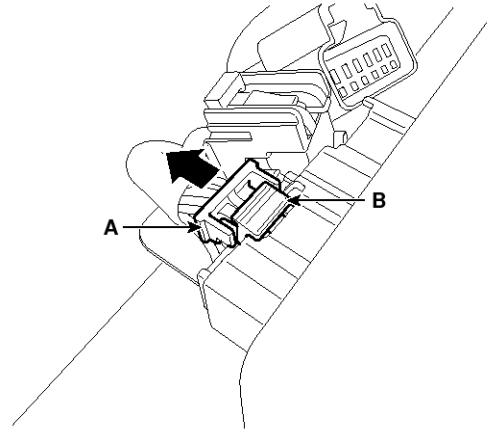


SVGBE0427D

## NOTICE

Remove the fixing clip (A) as shown arrow direction, and then remove connector by pressing the knob (B).

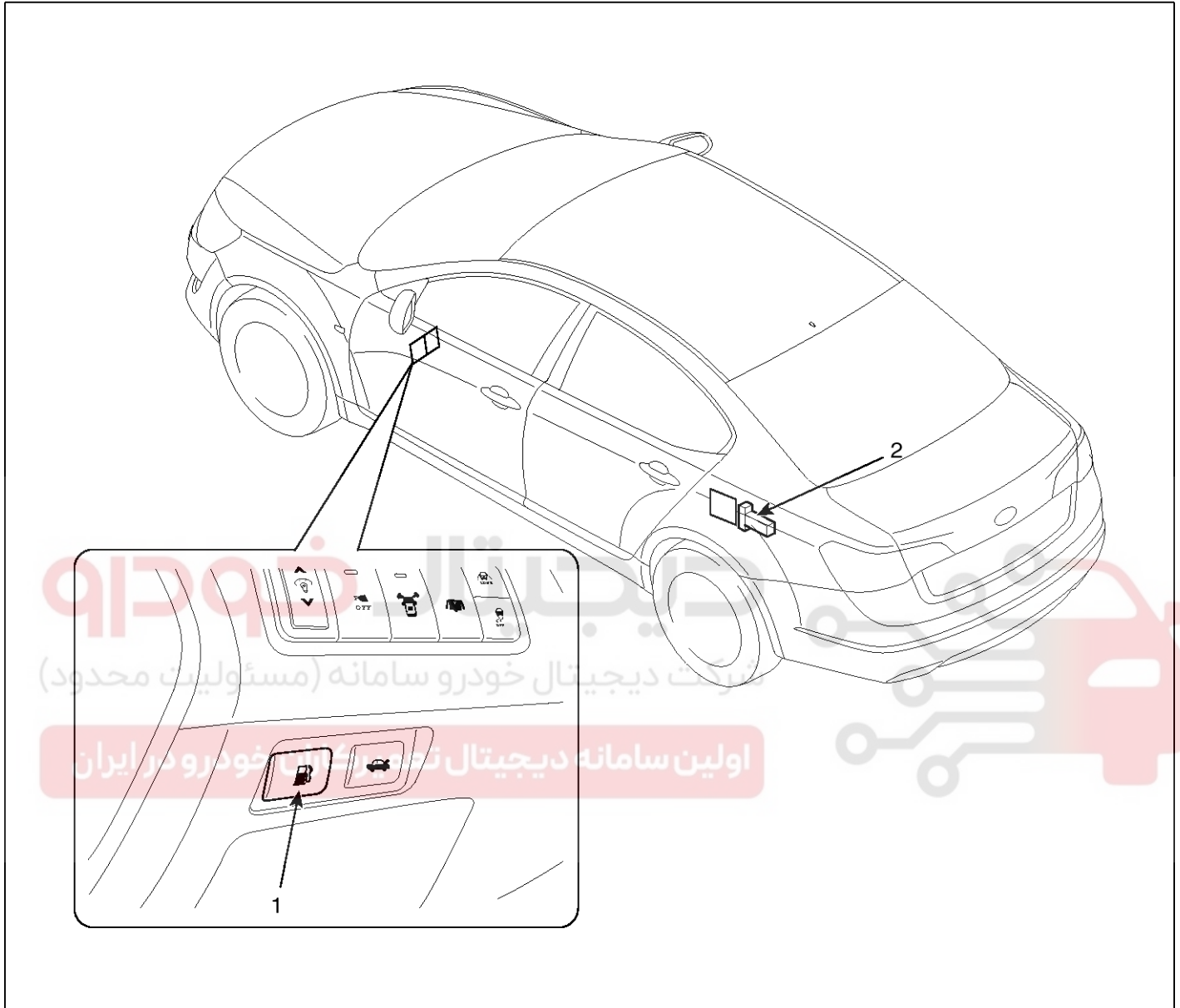
Make sure the connectors and fixing clips are plugged in properly when installing process.



SVGBE0428D

## Installation [Front Seat]

1. Install the connectors and air ventilation control unit.
2. Install the air ventilation duct and blower.
3. Install the seat back cover.
4. Install the seat assembly and seat track cover.

**BE-318****Body Electrical System****Fuel Filler Door****Component Location**

SVGB10052D

1. Fuel filler door open switch

2. Fuel filler door release actuator

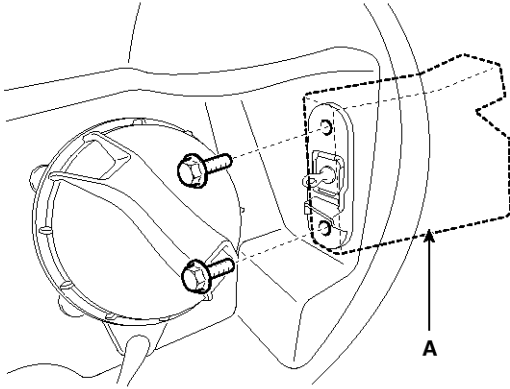
# Fuel Filler Door

BE-319

## Fuel Filler Door Release Actuator

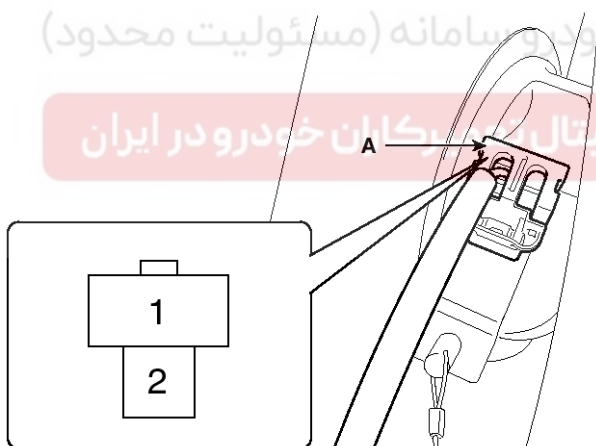
### Inspection

1. Open the fuel filler door and remove the fuel filler door release actuator (A) after loosening the mounting bolts.



SVGB10085D

2. Remove the trunk room left side trim.  
(Refer to the BD group - "Interior trim")
3. Disconnect the release actuator connector (A).



SVGB10086D

4. Check for continuity between terminal No.1 and No.2.  
If there is no continuity, replace the fuel filler door opener.





# BE-320

# Body Electrical System

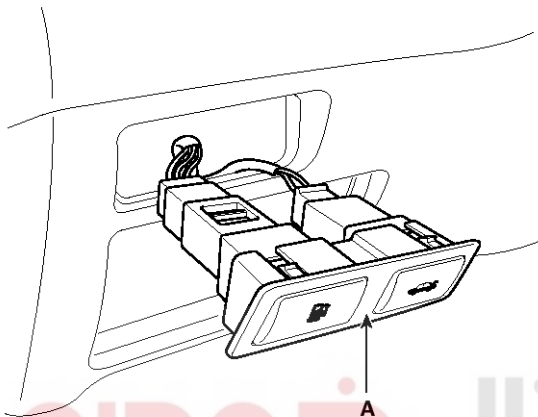
## Fuel Filler Door Open Switch

### Inspection

1. Open the junction box fuse cover.
2. Insert the hand to the junction box fuse cover hole and remove the crash pad side switch assembly (A) by pushing it.

**NOTICE**

Put on gloves to protect your hands.

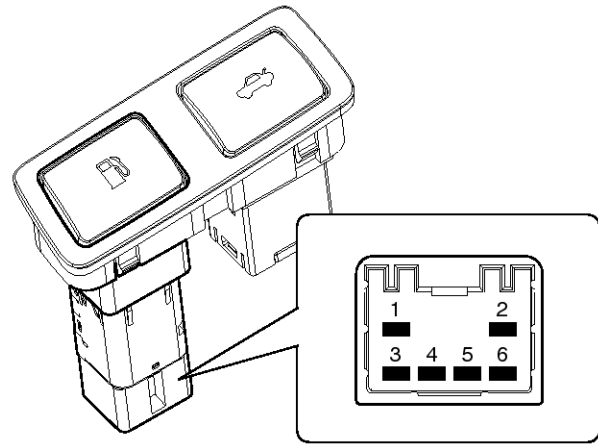


SVGB10053D

3. Disconnect the switch connector.

4. Check for continuity between the terminal No.4 and No.5.

If there is no continuity, replace the fuel filler door open switch.



SVGB10054D

| Terminal | Position | ON | OFF | Remarks          |
|----------|----------|----|-----|------------------|
| 4        |          |    |     |                  |
| 5        |          |    |     |                  |
| 6        |          |    |     | Illumination (+) |
| 3        |          |    |     | Illumination (-) |

SVGBE0015L

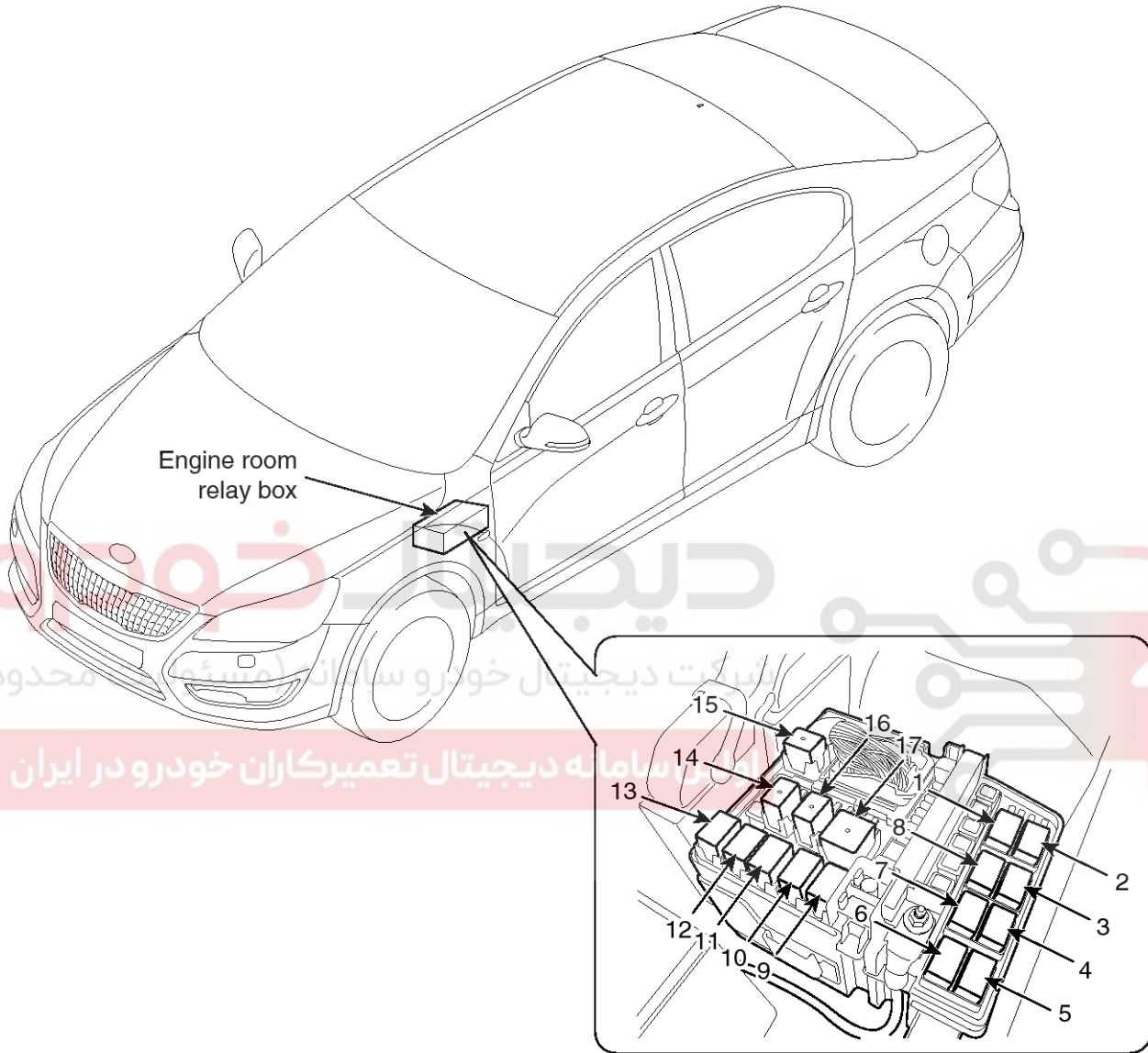
# Fuses And Relays

BE-321

## Fuses And Relays

### Component Location

[Engine Room Relay Box]



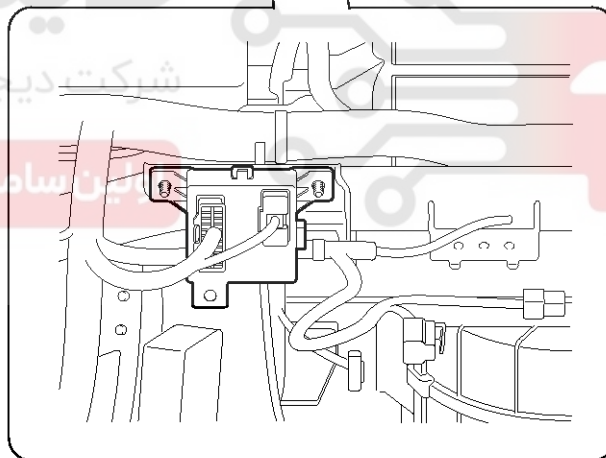
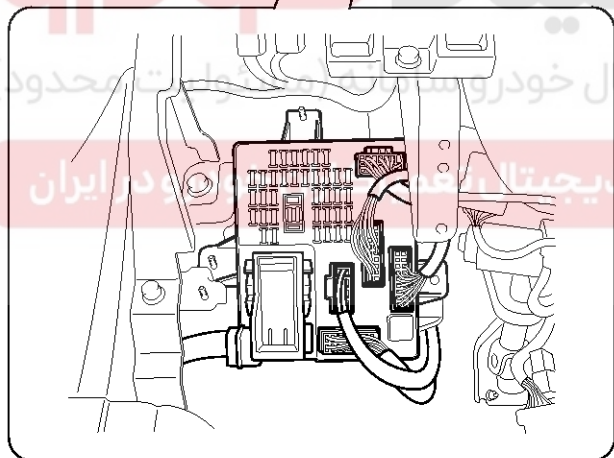
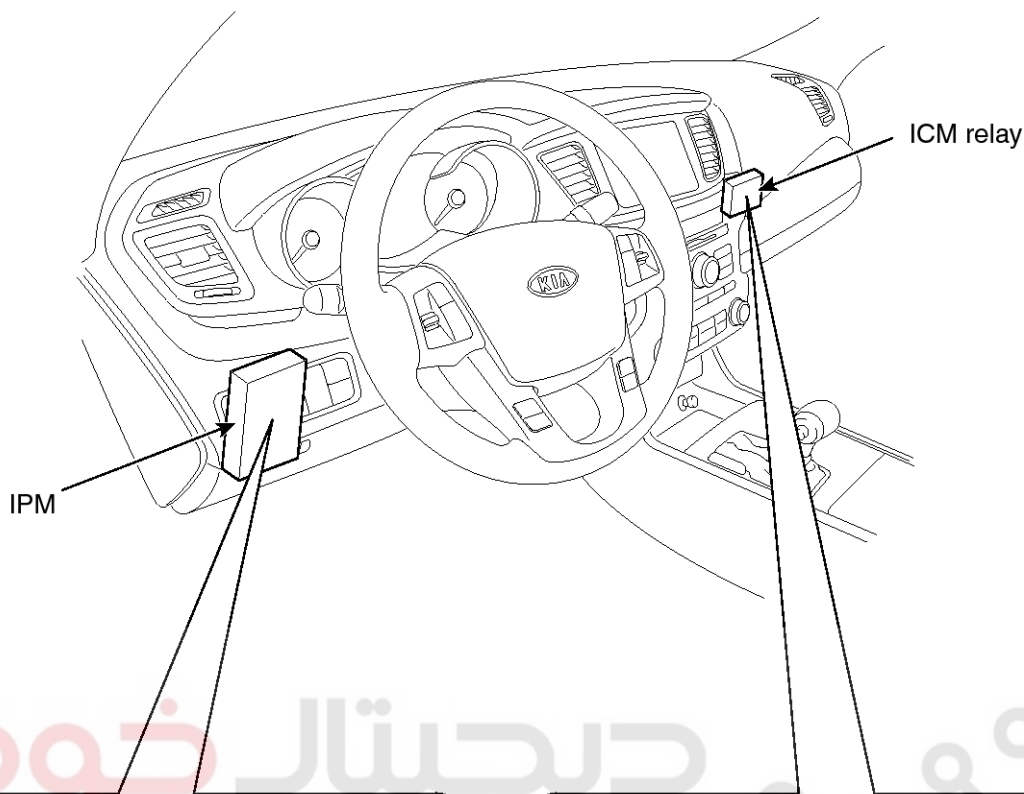
SVGBE0016L

- 1. Front deicer relay
- 2. Back up relay
- 3. IGN2
- 4. Rain sensor
- 5. Blower relay
- 6. Burglar alarm relay
- 7. Wiper relay
- 8. IGN1
- 9. Start #2 relay
- 10. Cooling pan #1 (High)
- 11. Cooling pan #2 (Low)
- 12. Start #1 relay
- 13. Rear defogger relay
- 14. Horn relay
- 15. ACC
- 16. Fuel pump relay
- 17. ECU relay

# BE-322

# Body Electrical System

[Passenger Compartment Relay]



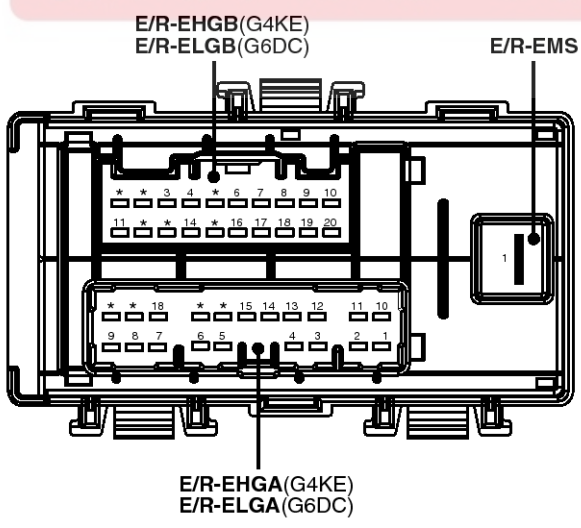
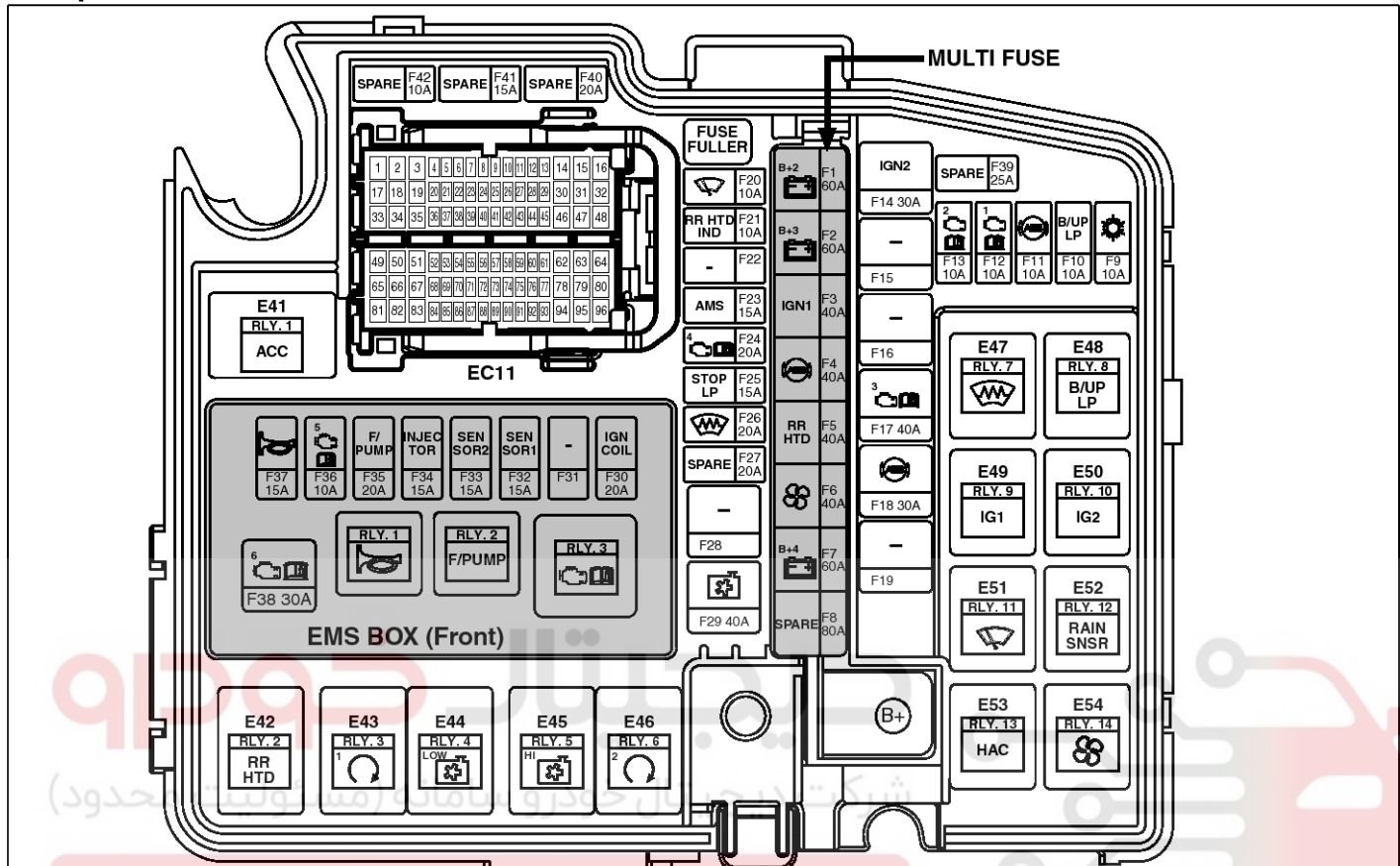
SVGBE0017L

# Fuses And Relays

BE-323

## Relay Box (Engine Compartment)

### Components



| Relay No. | Relay Name                      | Type       |
|-----------|---------------------------------|------------|
| E51       | RLY.1 ACC Relay                 | Plug Micro |
| E52       | RLY.2 Rear Defogger Relay       | Plug Micro |
| E53       | RLY.3 Start1 Relay              | Plug Micro |
| E54       | RLY.4 Cooling Fan (Low) Relay   | Plug Micro |
| E55       | RLY.5 Cooling Fan (High) Relay  | Plug Micro |
| E56       | RLY.6 Start2 Relay              | Plug Micro |
| E57       | RLY.7 Front Wiper Deicer Relay  | Plug Micro |
| E58       | RLY.8 Back-up Lamp Relay        | Plug Micro |
| E59       | RLY.9 IG1 Relay                 | Plug Micro |
| E60       | RLY.10 IG2 Relay                | Plug Micro |
| E61       | RLY.11 Wiper Relay              | Plug Micro |
| E62       | RLY.12 Rain Sensor Relay        | Plug Micro |
| E63       | RLY.13 Burglar Alarm Horn Relay | Plug Micro |
| E64       | RLY.14 Blower Relay             | Plug Micro |
| EMS BOX   | RLY.15 Horn Relay               | Plug Micro |
|           | RLY.16 Fuel Pump Relay          | Plug Micro |
|           | RLY.17 Engine Control Relay     | Plug Mini  |

✘ USE THE DESIGNATED FUSE AND RELAY ONLY.

SVGBE0393L

BE-324

Body Electrical System

| Fuse No.   | (A)              | Symbol                                                                                  | Circuit Protected                                                                                                                                                                                                                                    |
|------------|------------------|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MULTI FUSE | F1               | 60A    | IPM (Fuse - F7/ F8/ F9/ F19, IPS Control - IPS1/ IPS2/ IPS3/ IPS5/ IPS7)                                                                                                                                                                             |
|            | F2               | 60A    | IPM (Fuse - F17/ F24/ F25/ F26/ F33/ F34)                                                                                                                                                                                                            |
|            | F3               | 40A <b>IGN1</b>                                                                         | [W/O Smart Key] Ignition Switch, [With Smart Key] RLY. 1 (ACC Relay), RLY. 9 (IG1 Relay)                                                                                                                                                             |
|            | F4               | 40A    | ESP Control Module, ABS Control Module                                                                                                                                                                                                               |
|            | F5               | 40A <b>RR HTD</b>                                                                       | RLY. 2 (Rear Defogger Relay)                                                                                                                                                                                                                         |
|            | F6               | 40A    | RLY. 14 (Blower Relay)                                                                                                                                                                                                                               |
|            | F7               | 60A    | IPM (Fuse- F2/ F10, IPS Control - IPS 0/ IPS4/ TURN/ IPS6)                                                                                                                                                                                           |
|            | F8               | 80A <b>SPARE</b>                                                                        | -                                                                                                                                                                                                                                                    |
| FUSE       | F9               | 10A    | A/C Control Module                                                                                                                                                                                                                                   |
|            | F10              | 10A <b>B/UP LP</b>                                                                      | RLY. 8 (Back-up Lamp Relay), Stop Lamp Switch, Multipurpose Check Connector                                                                                                                                                                          |
|            | F11              | 10A <b>IGN</b>                                                                          | RLY. 6 (Start2 Relay), Alternator (G6DC)                                                                                                                                                                                                             |
|            | F12              | 10A    | PCM, Transaxle Range Switch                                                                                                                                                                                                                          |
|            | F13              | 30A <b>SPARE</b>                                                                        | -                                                                                                                                                                                                                                                    |
|            | F14              | 30A <b>IGN 2</b>                                                                        | [W/O Smart Key] Ignition Switch, RLY. 3 (Start1 Relay), [With Smart Key] RLY. 3 (Start1 Relay), RLY. 10 (IG2 Relay)                                                                                                                                  |
|            | F15              | 40A    | IPM (Fuse - F4/ F12/ F18/ F35, Power Connector - F27/ F28)                                                                                                                                                                                           |
|            | F16              | -                                                                                       | -                                                                                                                                                                                                                                                    |
|            | F17              | 40A    | EMS Box (Fuse - F35/ F36/ F37/ F38)                                                                                                                                                                                                                  |
|            | F18              | 30A    | ESP Control Module, ABS Control Module                                                                                                                                                                                                               |
|            | F19              | -                                                                                       | -                                                                                                                                                                                                                                                    |
|            | F20              | 10A    | IPM, RLY. 11 (Wiper Relay), Front Wiper Motor                                                                                                                                                                                                        |
|            | F21              | -                                                                                       | -                                                                                                                                                                                                                                                    |
|            | F22              | 10A <b>AMS</b>                                                                          | (Not Used)                                                                                                                                                                                                                                           |
|            | F23              | 20A    | ICM Relay Box (Head Lamp Washer Relay)                                                                                                                                                                                                               |
|            | F24              | 20A    | PCM (G4KE)                                                                                                                                                                                                                                           |
|            | F25              | 15A <b>STOP LP</b>                                                                      | Stop Lamp Switch                                                                                                                                                                                                                                     |
|            | F26              | 20A    | RLY. 7 (Front Wiper Deicer Relay)                                                                                                                                                                                                                    |
|            | F27              | 20A <b>DIAGNOSIS</b>                                                                    | Multipurpose Check Connector                                                                                                                                                                                                                         |
|            | F28              | -                                                                                       | -                                                                                                                                                                                                                                                    |
|            | F29              | 40A  | RLY. 4 (Cooling Fan (Low) Relay), RLY. 5 (Cooling Fan (High) Relay)                                                                                                                                                                                  |
|            | F30              | 20A <b>IGN COIL</b>                                                                     | Ignition Coil #1 /#2 /#3 /#4 (G4KE), Ignition Coil #1 /#2 /#3 /#4 /#5 /#6 (G6DC), Condenser (G4KE), Condenser #1 /#2 (G6DC)                                                                                                                          |
|            | F31              | -                                                                                       | -                                                                                                                                                                                                                                                    |
|            | F32              | 15A <b>SENSOR1</b>                                                                      | G4KE : Immobilizer Module, Camshaft Position Sensor #1 /#2, Crankshaft Position Sensor, Oil Control Valve #1 /#2, Canister Purge Control Solenoid Valve Variable Intake Manifold Valve, G6DC : Immobilizer Module, PCM, Oxygen Sensor #1 /#2 /#3 /#4 |
|            | F33              | 15A <b>SENSOR2</b>                                                                      | G4KE : Oxygen Sensor (Up)/(Down), RLY. 5 (Cooling Fan (High) Relay)<br>G6DC : PCM, Oil Control Valve #1 /#2, Canister Purge Control Solenoid Valve, Variable Intake Manifold Valve #1 /#2, RLY. 5 (Cooling Fan (High) Relay)                         |
|            | F34              | 15A <b>INJECTOR</b>                                                                     | Injector #1/ #2/ #3/ #4 (G4KE), Injector #1/ #2/ #3/ #4/ #5/ #6 (G6DC), PCM (G6DC), RLY. 16 (Fuel Pump Relay)                                                                                                                                        |
|            | F35              | 20A <b>F/PUMP</b>                                                                       | RLY. 16 (Fuel Pump Relay)                                                                                                                                                                                                                            |
|            | F36              | 10A  | PCM, Alternator (G6DC)                                                                                                                                                                                                                               |
|            | F37              | 15A  | RLY. 13 (Burglar Alarm Horn Relay), RLY. 15 (Horn Relay)                                                                                                                                                                                             |
|            | F38              | 30A  | RLY. 17 (Engine Control Relay)                                                                                                                                                                                                                       |
|            | F39              | 25A <b>SPARE</b>                                                                        | -                                                                                                                                                                                                                                                    |
|            | F40              | 20A <b>SPARE</b>                                                                        | -                                                                                                                                                                                                                                                    |
| F41        | 15A <b>SPARE</b> | -                                                                                       |                                                                                                                                                                                                                                                      |
| F42        | 10A <b>SPARE</b> | -                                                                                       |                                                                                                                                                                                                                                                      |

✱ USE THE DESIGNATED FUSE AND RELAY ONLY.

SVGBE0394L

# Fuses And Relays

# BE-325

## Inspection

### Power Relay Test (Type A)

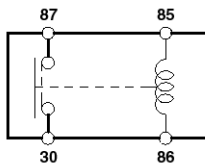
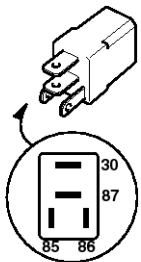
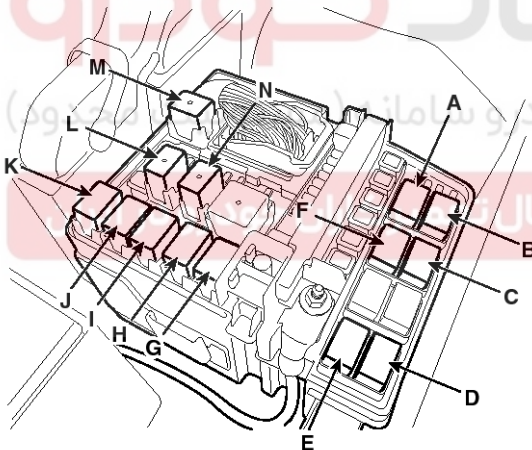
#### NOTICE

- Do not use pliers.
- Pliers will damage the relays, which could cause the engine to stall or not start.
- Carefully remove the relay using the relay puller.

Check for continuity between the terminals.

- |                        |                           |
|------------------------|---------------------------|
| A. Front deicer        | H. Cooling fan (HI) relay |
| B. Back up lamp relay  | I. Cooling fan (LO) relay |
| C. IGN2                | J. Start #1 relay         |
| D. Blower relay        | K. Rear defogger          |
| E. Burglar alarm relay | L. Horn relay             |
| F. IGN1                | M. ACC                    |
| G. Start #2 relay      | N. Fuel pump relay        |

1. There should be continuity between the No.30 and No.87 terminals when power and ground are connected to the No.85 and No.86 terminals.
2. There should be no continuity between the No.30 and No.87 terminals when power is disconnected.



SVGB10058D

|              |     |    |     |    |
|--------------|-----|----|-----|----|
| Terminal     | 30  | 87 | 85  | 86 |
| Power        |     |    |     |    |
| Disconnected |     |    | ○—○ |    |
| Connected    | ○—○ |    | ⊖—⊕ |    |

SYFBE0150L

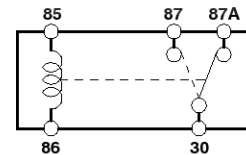
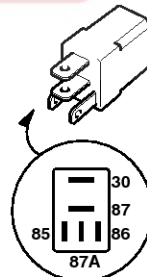
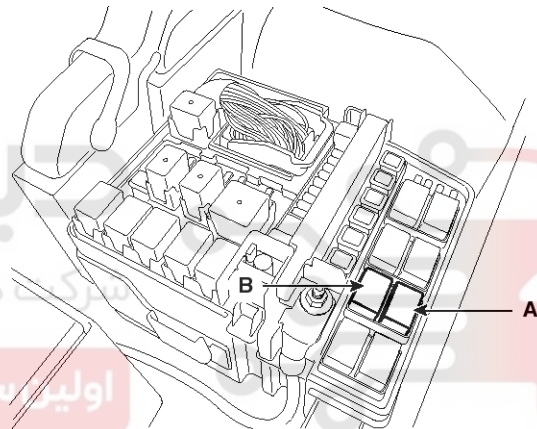
### Power Relay Test (Type B)

Check for continuity between the terminals.

A : Rain sensor relay

B : Wiper relay

1. There should be continuity between the No.30 and No.87 terminals when power and ground are connected to the No.85 and No.86 terminals.
2. There should be continuity between the No.30 and No.87 terminals when power is disconnected.



SVGB10059D

|              |     |    |     |     |     |
|--------------|-----|----|-----|-----|-----|
| Terminal     | 85  | 86 | 30  | 87  | 87A |
| Power        |     |    |     |     |     |
| Disconnected |     |    | ○—○ | ○—○ |     |
| Connected    | ⊕—⊖ |    | ○—○ |     |     |

SVGBE0018L



# BE-326

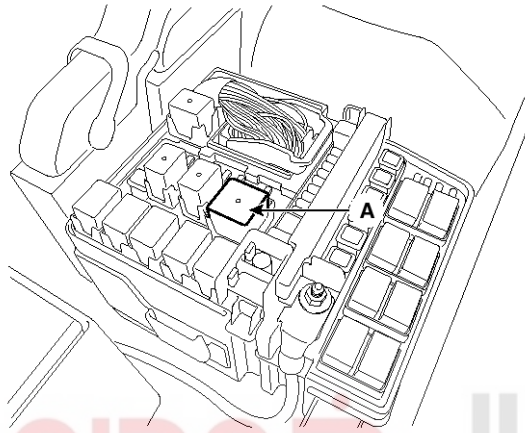
# Body Electrical System

## Power Relay Test (Type C)

Check for continuity between the terminals.

A : ECU relay

1. There should be continuity between the No.30, 87a and No.87 terminals when power and ground are connected to the No.85 and No.86 terminals.
2. There should be no continuity between the No.30, 87a and No.87 terminals when power is disconnected.



SVGB10060D

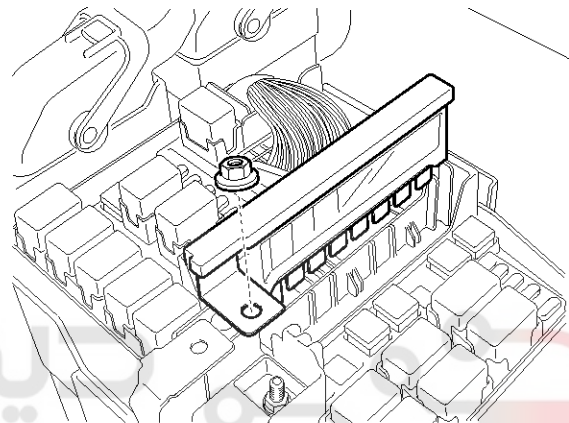
## Fuse Inspection

1. Be sure there is no play in the fuse holders, and that the fuses are held securely.
2. Are the fuse capacities for each circuit correct?
3. Are there any blown fuses?

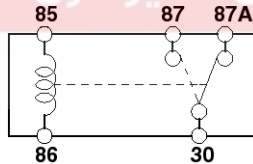
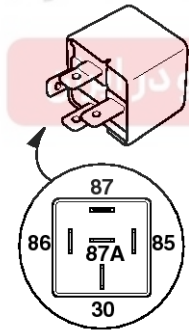
If a fuse is to be replaced, be sure to use a new fuse of the same capacity. Always determine why the fuse blew first and completely eliminate the problem before installing a new fuse.

## Multi Fuse

Multi Fuse is for optimizing the engine room package.



SVGB10088D



SVGBE0367D

| Terminal     | 85 | 86 | 30 | 87 | 87A |
|--------------|----|----|----|----|-----|
| Power        |    |    |    |    |     |
| Disconnected |    |    | ○  | —  | ○   |
| Connected    | ⊕  | ⊖  | ○  | ○  |     |

SVGBE0018L

## NOTICE

- Multi fuse is needed to replace in the mass when it damaged only one fuse.
- When replace the multi fuse, refer to the "Engine compartment - component location" diagram exactly.
- Use the multi fuse capacities for each circuit correctly.

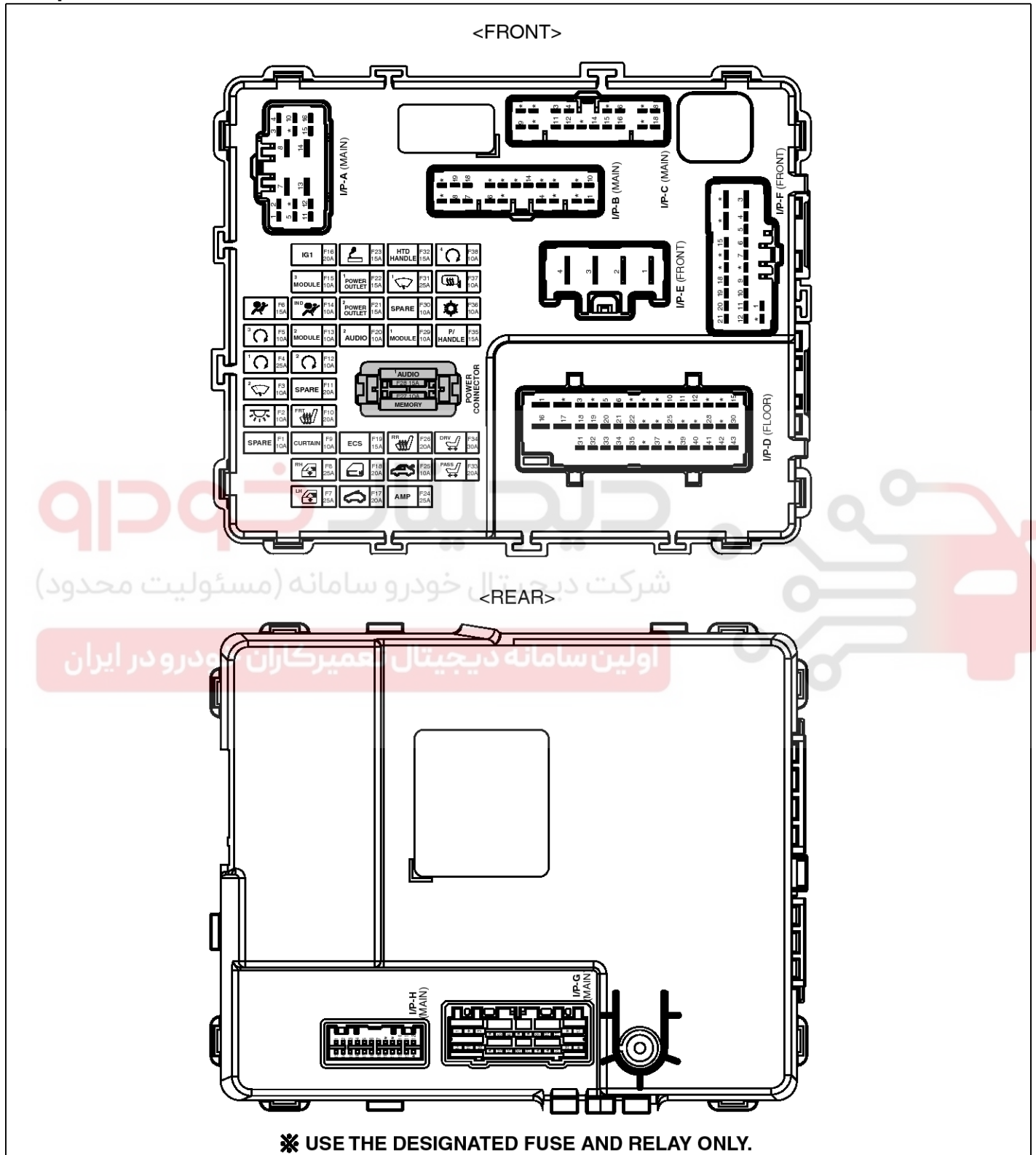


# Fuses And Relays

# BE-327

## Relay Box (Passenger Compartment)

### Components



SVGBE0391L

BE-328

Body Electrical System

| No. | (A) | Symbol              | Fuse Name    | Circuit Protected                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | No. | (A) | Symbol                    | Fuse Name      | Circuit Protected                                                                                                                                                                                                                                                                                                                                                                               |
|-----|-----|---------------------|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|---------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| F1  | 10A | SPARE               | -            | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | F20 | 10A | <sup>2</sup> AUDIO        | AUDIO 2        | Audio, Audio Monitor, Amp, Overhead Console Lamp Switch PDM, Smart Key Control Module                                                                                                                                                                                                                                                                                                           |
| F2  | 10A |                     | ROOM LP      | ICM Relay Box (Room Lamp Auto Cut Relay)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | F21 | 15A | <sup>2</sup> POWER OUTLET | POWER OUTLET 2 | Console Power Outlet                                                                                                                                                                                                                                                                                                                                                                            |
| F3  | 10A |                     | WIPER 2      | IPM (Washer Switch), Multifunction Switch (Wiper) Washer Motor                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | F22 | 15A | <sup>1</sup> POWER OUTLET | POWER OUTLET 1 | (Not Used)                                                                                                                                                                                                                                                                                                                                                                                      |
| F4  | 25A |                     | PDM 1        | PDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | F23 | 15A |                           | C/LIGHTER      | Front Cigarette Lighter                                                                                                                                                                                                                                                                                                                                                                         |
| F5  | 10A |                     | PDM 3        | PDM, Smart Key Control Module                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | F24 | 25A | AMP                       | AMP            | Amp                                                                                                                                                                                                                                                                                                                                                                                             |
| F6  | 15A |                     | A/BAG        | SRS Control Module                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | F25 | 10A |                           | TRUNK          | Trunk Lid Relay, Trunk Main Switch, Trunk Lid Motor Fuel Filler Door Switch                                                                                                                                                                                                                                                                                                                     |
| F7  | 25A |                     | P/PDW LH     | Driver Safety Power Window Module<br>Rear Door Mood Lamp LH<br>Driver Door Mood Lamp, Rear Power Window Switch LH                                                                                                                                                                                                                                                                                                                                                                                                                | F26 | 20A |                           | S/HEATER RR    | Rear Seat Warmer Module LH/RR                                                                                                                                                                                                                                                                                                                                                                   |
| F8  | 25A |                     | P/PDW RH     | Passenger Door Module, Passenger Door Mood Lamp<br>Rear Door Mood Lamp RH, Rear Power Window Switch RH                                                                                                                                                                                                                                                                                                                                                                                                                           | F27 | 10A | MEMORY                    | MEMORY         | Driver/Passenger Foot Lamp, Data Link Connector Auto Light & Photo Sensor, Instrument Cluster (MICOM, IND.) Rear Curtain Module, Door Warning Switch Garnish Lamp LH/RR/Center, Tilt & Telescopic Module A/C Control Module, Loom Lamp (Deluxe Type) Driver/Passenger Door Scuff Lamp, IMS Control Module Driver/Passenger Door Lamp, Driver/Passenger Door Module RF Receiver, Trunk Room Lamp |
| F9  | 10A | CURTAIN             | CURTAIN      | Driver/Passenger Door Module, Rear Curtain Module                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | F28 | 15A | <sup>1</sup> AUDIO        | AUDIO 1        | Audio, Audio Monitor                                                                                                                                                                                                                                                                                                                                                                            |
| F10 | 20A |                     | S/HEATER FRT | Driver/Passenger CCS Control Module<br>Driver/Passenger Seat Warmer Module                                                                                                                                                                                                                                                                                                                                                                                                                                                       | F29 | 10A | <sup>1</sup> MODULE       | MODULE 1       | PDM, Rear Curtain Module, Rain Sensor Panorama Sunroof, ICM Relay Box (Head Lamp Washer Relay)                                                                                                                                                                                                                                                                                                  |
| F11 | 20A | SPARE               | -            | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | F30 | 10A | SPARE                     | -              | -                                                                                                                                                                                                                                                                                                                                                                                               |
| F12 | 10A |                     | PDM 2        | FOB Holder, PDM, Smart Key Control Module Start Stop Button Switch                                                                                                                                                                                                                                                                                                                                                                                                                                                               | F31 | 25A |                           | WIPER 1        | Front Wiper Motor, Multifunction Switch (Wiper) E/R Fuse & Relay Box (RLY. 11, RLY. 12)                                                                                                                                                                                                                                                                                                         |
| F13 | 10A | <sup>2</sup> MODULE | MODULE 2     | ATM Shift Lever Illumination, Instrument Cluster Multifunction Switch (Remote Control) Tilt & Telescopic Module, Head Lamp Leveling Device Actuator LH/RR, Auto Head Lamp Leveling Device Module IMS Control Module, Head Lamp Leveling Device Switch Front CCS Switch, Front Seat Warmer Switch Driver/Passenger CCS Control Module Driver/Passenger Seat Warmer Module Rear Seat Warmer Module LH/RR, Rear Seat Warmer Switch Driver/Passenger Door Module, Electro Chromic Mirror LDWS Camera Module, Room Lamp (Deluxe Type) | F32 | 15A | HTD HANDLE                | HTD HANDLE     | Steering Wheel Heated                                                                                                                                                                                                                                                                                                                                                                           |
| F14 | 10A |                     | A/BAG IND    | Instrument Cluster (Air Bag IND.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | F33 | 20A |                           | P/SEAT PASS    | Passenger Manual Switch                                                                                                                                                                                                                                                                                                                                                                         |
| F15 | 10A | <sup>3</sup> MODULE | MODULE 3     | ABS Control Module, ESP Control Module, ESP Off Switch Yaw Rate Sensor, Steering Angle Sensor                                                                                                                                                                                                                                                                                                                                                                                                                                    | F34 | 30A |                           | P/SEAT DRI     | Driver Lumbar Support Switch, Driver Cushion Extension Switch Driver Manual Switch, IMS Control Module                                                                                                                                                                                                                                                                                          |
| F16 | 20A | IG1                 | IG 1         | E/R Fuse & Relay Box (Fuse - F10, F11, F12)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | F35 | 15A |                           | P/HANDLE       | Key Solenoid, Tilt & Telescopic Module, Sport Mode Switch                                                                                                                                                                                                                                                                                                                                       |
| F17 | 20A | SUNROOF             | SUNROOF      | Panorama Sunroof                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | F36 | 10A |                           | A/CON          | A/C Control Module, Ionizer, E/R Fuse & Relay Box (RLY. 14)                                                                                                                                                                                                                                                                                                                                     |
| F18 | 20A | DR LOCK             | DR LOCK      | Driver Door Module                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | F37 | 10A |                           | HTD MRR        | Driver/Passenger Power Outside Mirror, A/C Control Module                                                                                                                                                                                                                                                                                                                                       |
| F19 | 15A | ECS                 | ECS          | ICM Relay Box (Rear Fog Lamp Relay)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | F38 | 10A |                           | START          | [W/O Smart Key] Ignition Switch, Burglar Alarm Relay E/R Fuse & Relay Box (RLY. 3-G4KE, RLY. 6-G6DC) [With Smart Key] PDM, E/R Fuse & Relay Box (RLY. 6)                                                                                                                                                                                                                                        |

شركت دیجیتالی خودرو سامانه (مسئولیت محدود)  
**✱ USE THE DESIGNATED FUSE AND RELAY ONLY.**

اولین سامانه دیجیتالی تعمیرکاران خودرو در ایران

SVGBE0392L

Fuse Inspection

1. Be sure there is no play in the fuse holders, and that the fuses are held securely.
2. Are the fuse capacities for each circuit correct?
3. Are there any blown fuses?

If a fuse is to be replaced, be sure to use a new fuse of the same capacity. Always determine why the fuse blew first and completely eliminate the problem before installing a new fuse.

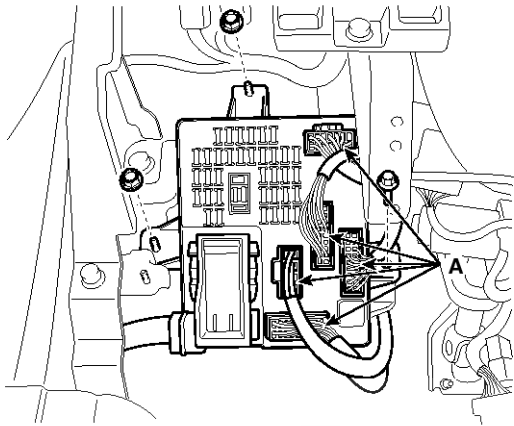
# Fuses And Relays

## BE-329

### Removal

#### Passenger Compartment Junction Box (SJB)

1. Disconnect the negative(-) battery terminal.
2. Remove the crash pad lower panel.  
(Refer to the BD group - "Crash pad")
3. Disconnect the connectors (A) from the IPM (Intelligent intergrated Platform Module).



SVGB10061D

4. Remove the IPM after loosening the mounting nuts (2EA) and bolt (1EA).
5. Disconnect the connectors from the back side of the IPM.

### Installation

1. Install IPM (Intelligent intergrated Platform Module).
2. Connect the IPM connector.
3. Install the crash pad lower panel.



اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

**BE-330****Body Electrical System****ICM (Integrated Circuit Module) Relay Box****Specification**

|                            |                                             |
|----------------------------|---------------------------------------------|
| Rated voltage              | DC 12V                                      |
| Operating voltage          | DC 9~15V                                    |
| Use of temperature range   | -40°C ~ 85°C                                |
| Preserve temperature range | -40°C ~ 125°C                               |
| Insulation resistance      | 100MΩ MIN. / 500VM                          |
| Rated coil current         | MAX 160mA (But, resistor type is max 180mA) |

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

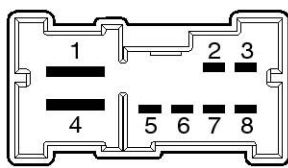
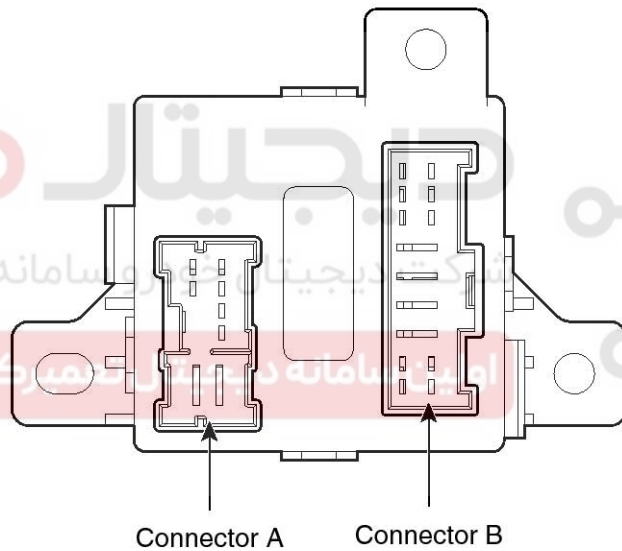
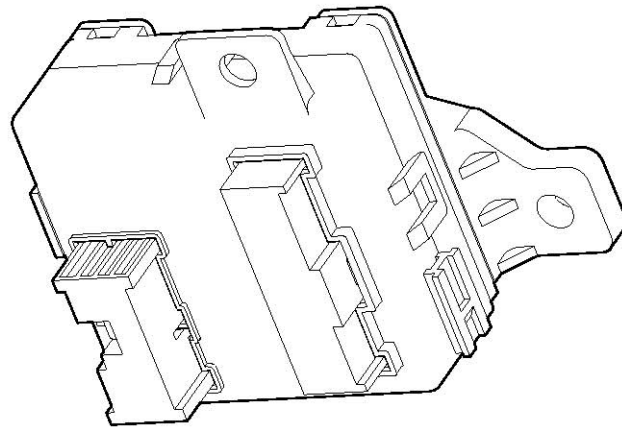
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



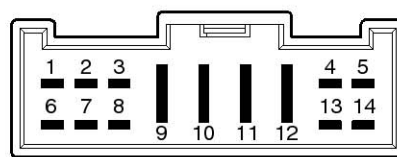
# Fuses And Relays

# BE-331

## Component



Connector A



Connector B

SVGBE0019L

**BE-332****Body Electrical System****Input/Output Specification**

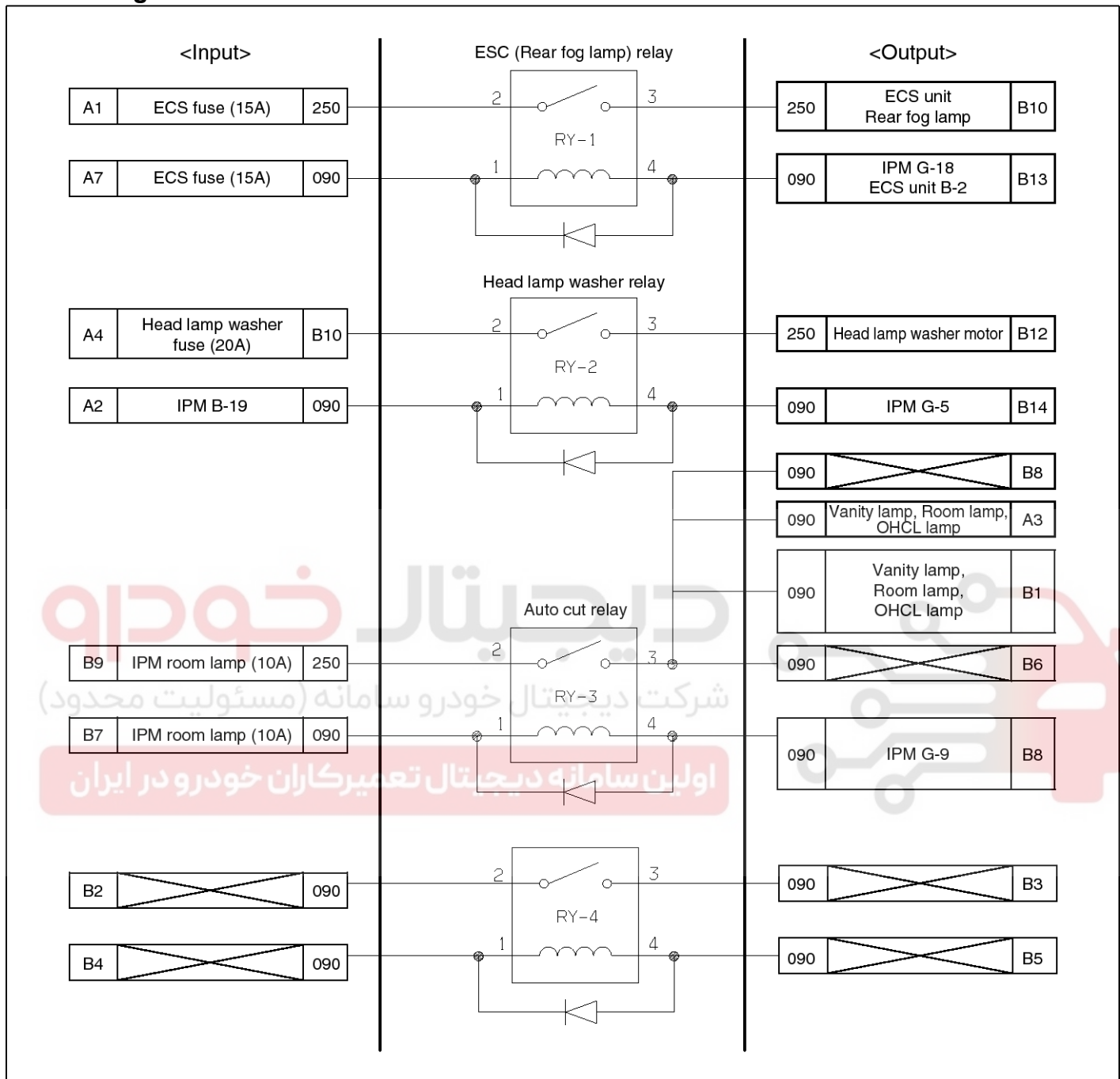
| No. | Connector A                                    | No. | Connector B                                     |
|-----|------------------------------------------------|-----|-------------------------------------------------|
| 1   | ECS fuse 15A (IPM A-15 connector)              | 1   | Vanity lamp, room lamp, OHCL power input        |
| 2   | IPM B-19 connector                             | 2   | -                                               |
| 3   | Vanity lamp, room lamp, OHCL power input       | 3   | -                                               |
| 4   | Head lamp washer fuse (20A)<br>(E/ROOM BOX 67) | 4   | -                                               |
| 5   | -                                              | 5   | -                                               |
| 6   | -                                              | 6   | -                                               |
| 7   | ICM A-1 connector                              | 7   | IPM room lamp fuse (10A)<br>(IPM B-1 connector) |
| 8   |                                                | 8   | IPM G-9 connector                               |
|     |                                                | 9   | IPM room lamp fuse (10A)<br>(IPM B-1 connector) |
|     |                                                | 10  | ECS A-1 & A-7 connector,<br>Front fog lamp      |
|     |                                                | 11  | -                                               |
|     |                                                | 12  | Head lamp washer motor                          |
|     |                                                | 13  | ECS B-2, IPM G-18 connector                     |
|     |                                                | 14  | IPM G-5 connector                               |

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

# Fuses And Relays

BE-333

## Circuit Diagram



SVGBE0020L

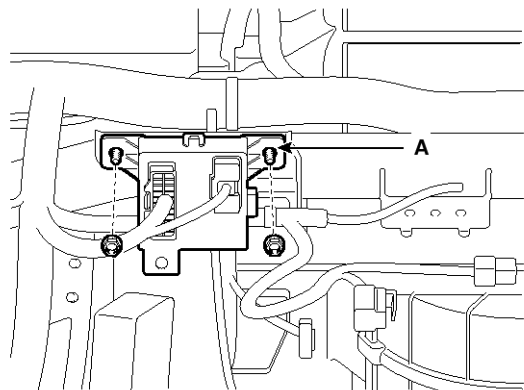


## BE-334

## Body Electrical System

### Description

The ICM relay is united with rear fog lamp relay, ECS relay, auto cut relay and head lamp washer relay which installed inside the passenger crash pad.



SVGB10064D

### Inspection

#### Rear Fog Lamp Relay

Check for continuity between the terminals.

1. There should be continuity between the No.1 in the A and No.10 in the B terminals when power and ground are connected to the No.7 in the A and No.13 terminals in the B terminals.
2. There should be no continuity between the No.1 in the A and No.10 terminals in the A terminals when power is disconnected.

#### ECS Relay

Check for continuity between the terminals.

1. There should be continuity between the No.1 in the A and No.10 in the B terminals when power and ground are connected to the No.7 in the A and No.13 terminals in the B terminals.
2. There should be no continuity between the No.1 in the A and No.10 terminals in the A terminals when power is disconnected.

#### Head Lamp Washer Relay

Check for continuity between the terminals.

1. There should be continuity between the No.4 in the A and No.12 in the B terminals when power and ground are connected to the No.2 in the A and No.14 terminals in the B terminals.
2. There should be no continuity between the No.4 in the A and No.12 terminals in the B terminals when power is disconnected.

#### Auto Cut Relay

Check for continuity between the terminals.

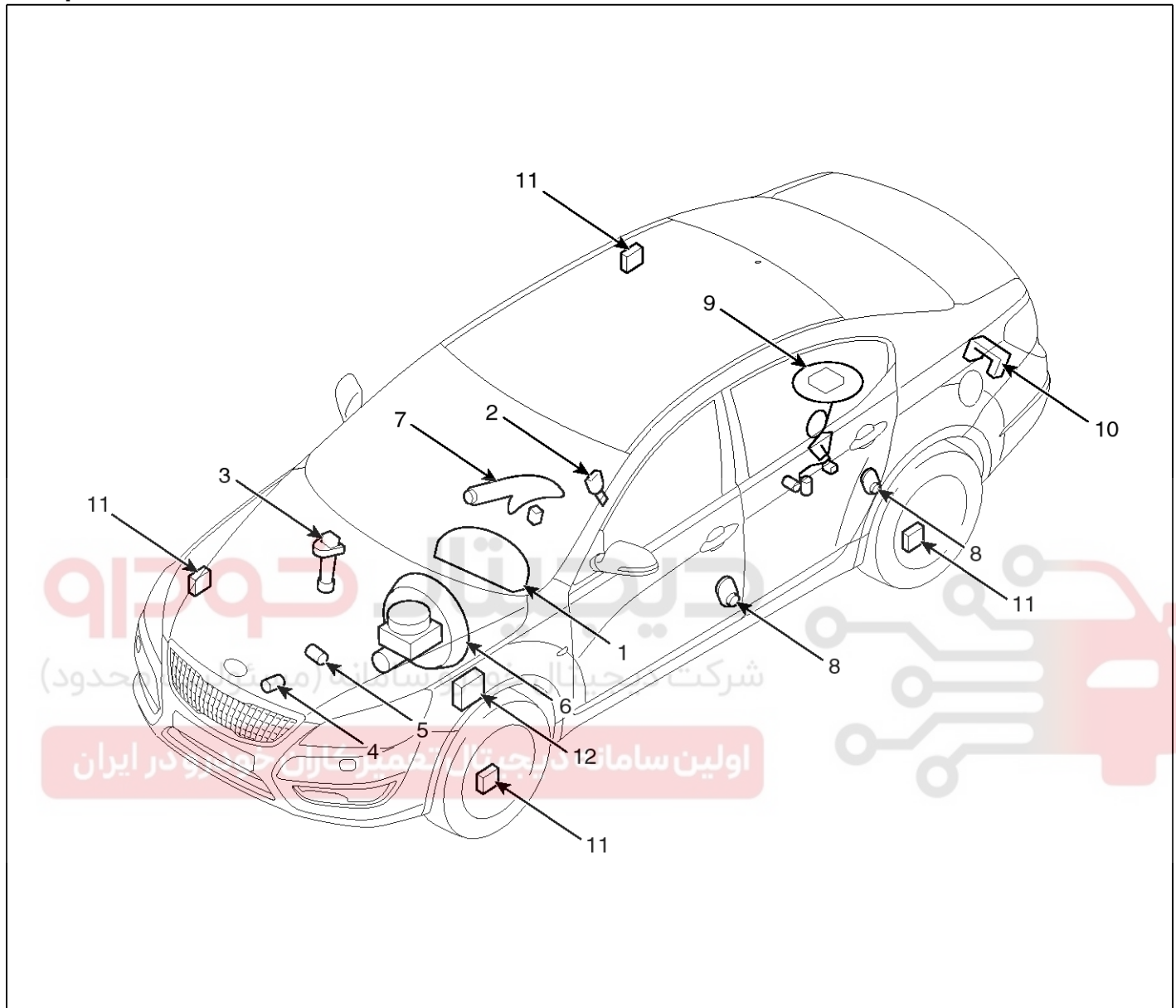
1. There should be continuity between the No.3 in the A (or No.1 in the B) and No.9 in the B terminals when power and ground are connected to the No.7 in the B and No.8 terminals in the B terminals.
2. There should be no continuity between the No.3 in the A (or No.1 in the B) and No.9 terminals in the B terminals when power is disconnected.

# Indicators And Gauges

BE-335

## Indicators And Gauges

### Component Location



SVGBE0350D

- |                                      |                           |
|--------------------------------------|---------------------------|
| 1. Instrument cluster assembly       | 7. Parking brake switch   |
| 2. Seat belt switch                  | 8. Door switch            |
| 3. Vehicle speed sensor              | 9. Fuel gauge sender      |
| 4. Engine coolant temperature sender | 10. Trunk lid open switch |
| 5. Oil pressure switch               | 11. Wheel speed sensor    |
| 6. Brake fluid level warning switch  | 12. ABS ECU               |

# BE-336

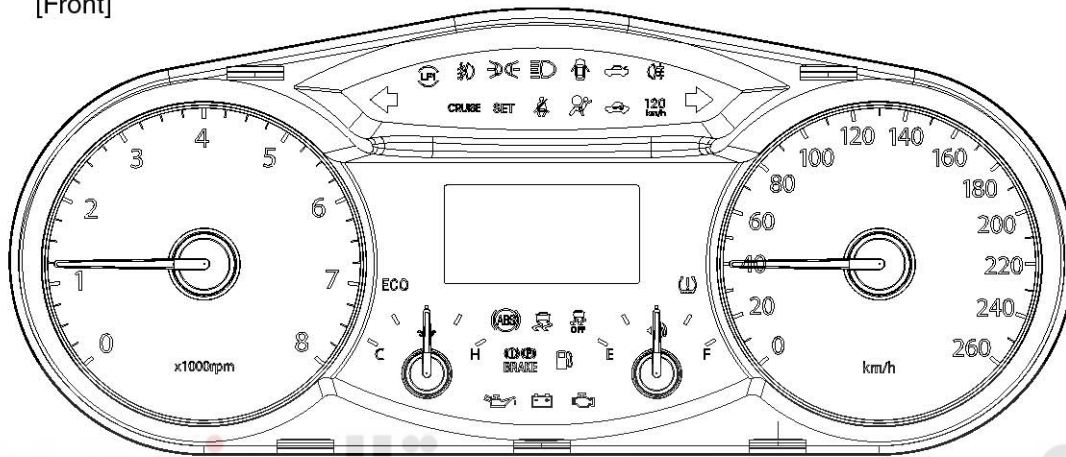
# Body Electrical System

## Instrument Cluster

### Components

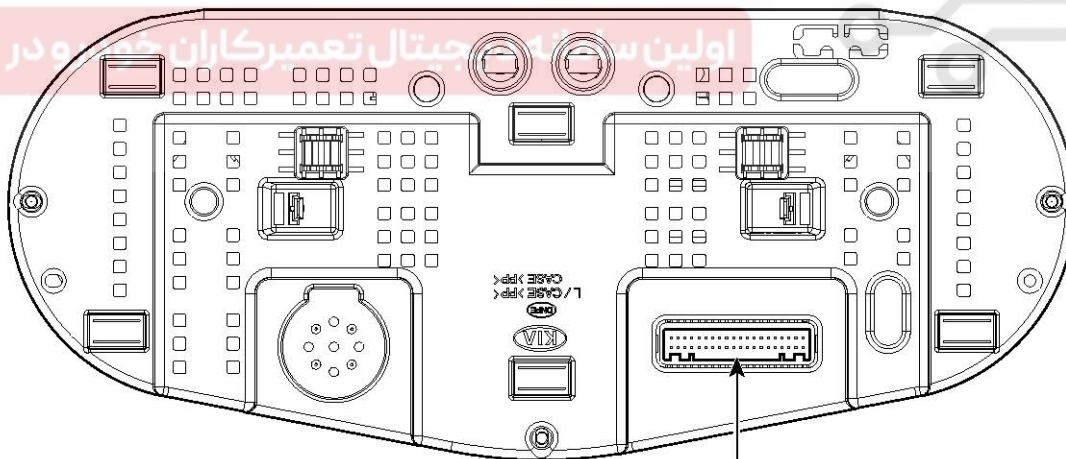
[Standard]

[Front]



شرکت دیجیتال خودرو سامانه (مسئول محدود)

اولین سیستم دیجیتالی تعمیرکاران خودرو در ایران



Connector A

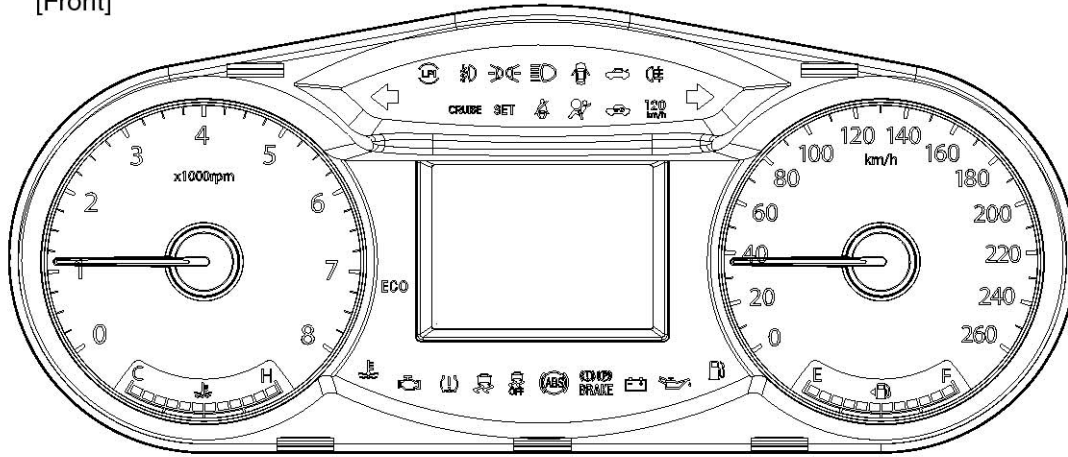
SVGBE0021L

# Indicators And Gauges

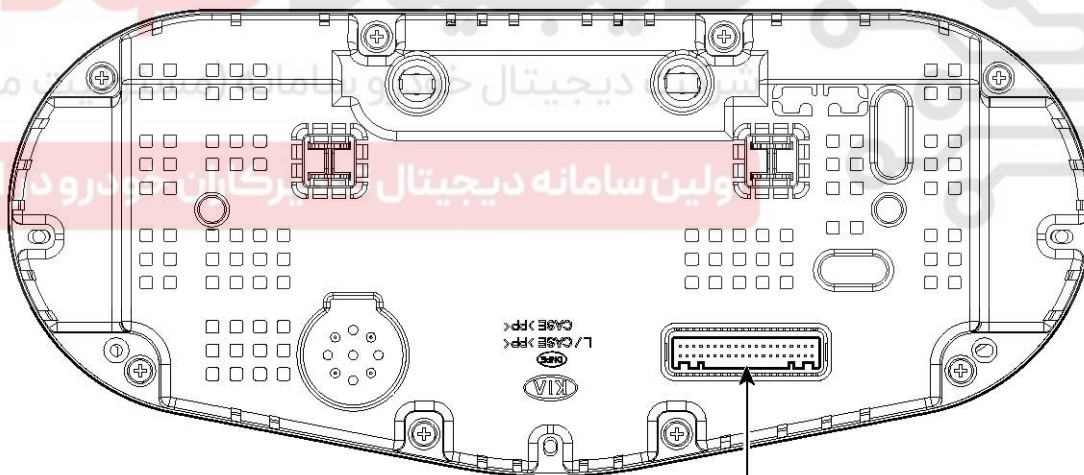
# BE-337

[Supervision]

[Front]



[Rear]



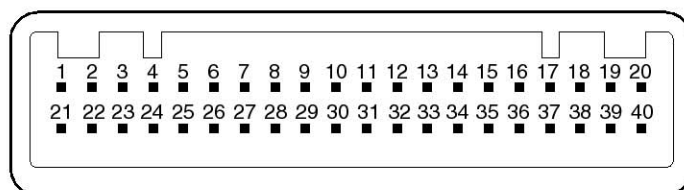
Connector A

SVGBE0022L

## BE-338

## Body Electrical System

## Input/Output Specification



Connector A

| No. | Description               | No. | Description             |
|-----|---------------------------|-----|-------------------------|
| 1   | Gear R (AT)               | 21  | Trip switch             |
| 2   | Gear N (AT)               | 22  | Reset switch            |
| 3   | Gear D (AT)               | 23  | Rheostat UP switch      |
| 4   | Gear S (AT)               | 24  | Rheostat DOWN switch    |
| 5   | Power GND                 | 25  | -                       |
| 6   | Signal GND                | 26  | Battery (+)             |
| 7   | -                         | 27  | IGN (+)                 |
| 8   | Air bag (+)               | 28  | -                       |
| 9   | Air bag (-)               | 29  | Washer fluid            |
| 10  | VS 4P output              | 30  | LIN                     |
| 11  | Engine check              | 31  | -                       |
| 12  | Oil pressure              | 32  | Illumination output (-) |
| 13  | Immobilizer $\varnothing$ | 33  | -                       |
| 14  | Battery charge            | 34  | Detent out              |
| 15  | Brake oil                 | 35  | -                       |
| 16  | Gear P (AT)               | 36  | C_CAN high              |
| 17  | Fuel (+)                  | 37  | C_CAN low               |
| 18  | Fuel (-)                  | 38  | -                       |
| 19  | Speaker output (+)        | 39  | B_CAN high              |
| 20  | Speaker output (-)        | 40  | B_CAN low               |

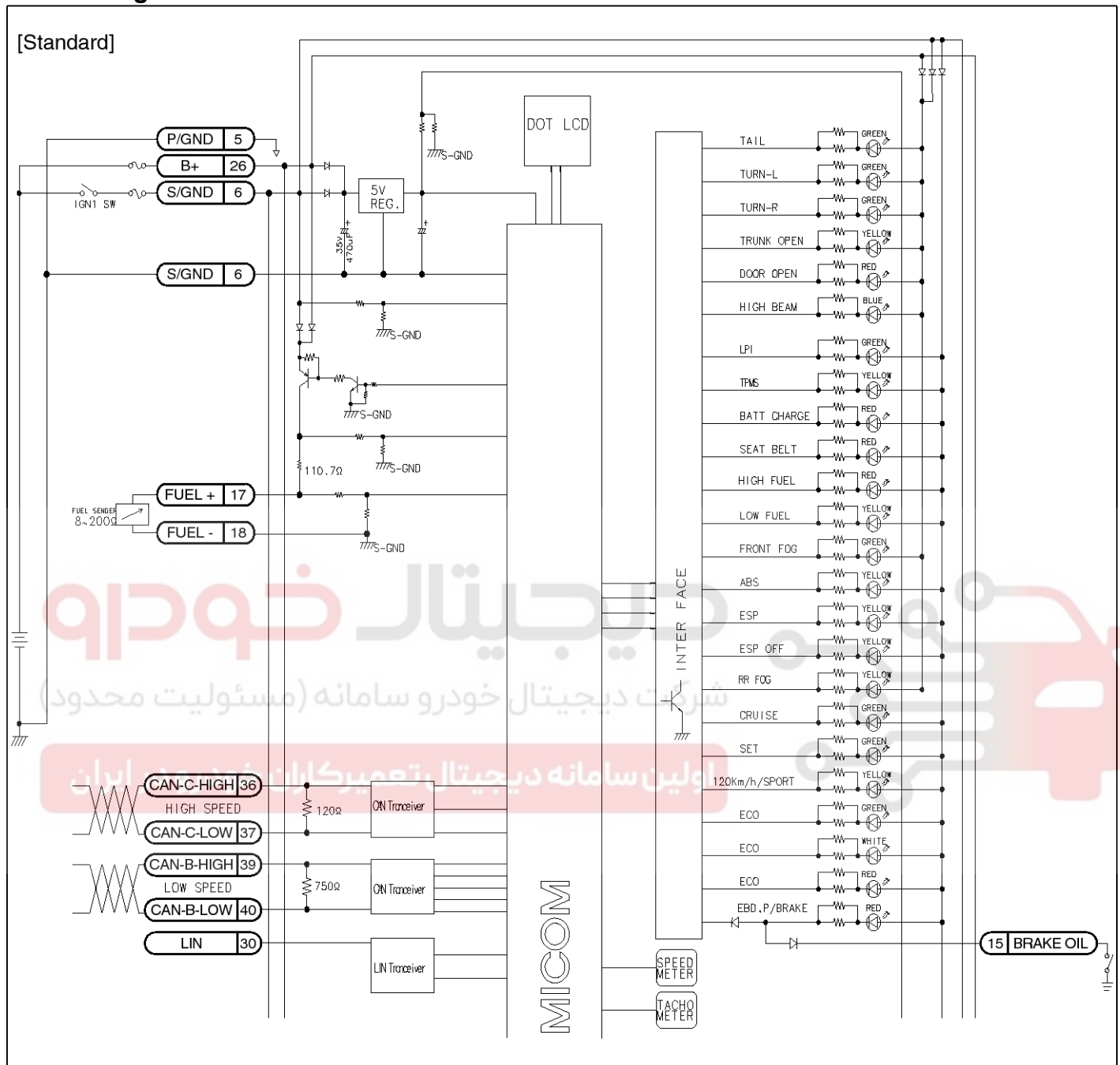
※ Immobilizer lamp is controlled by B\_CAN in button engine start system.

SVGBE0023L

# Indicators And Gauges

# BE-339

## Circuit Diagram

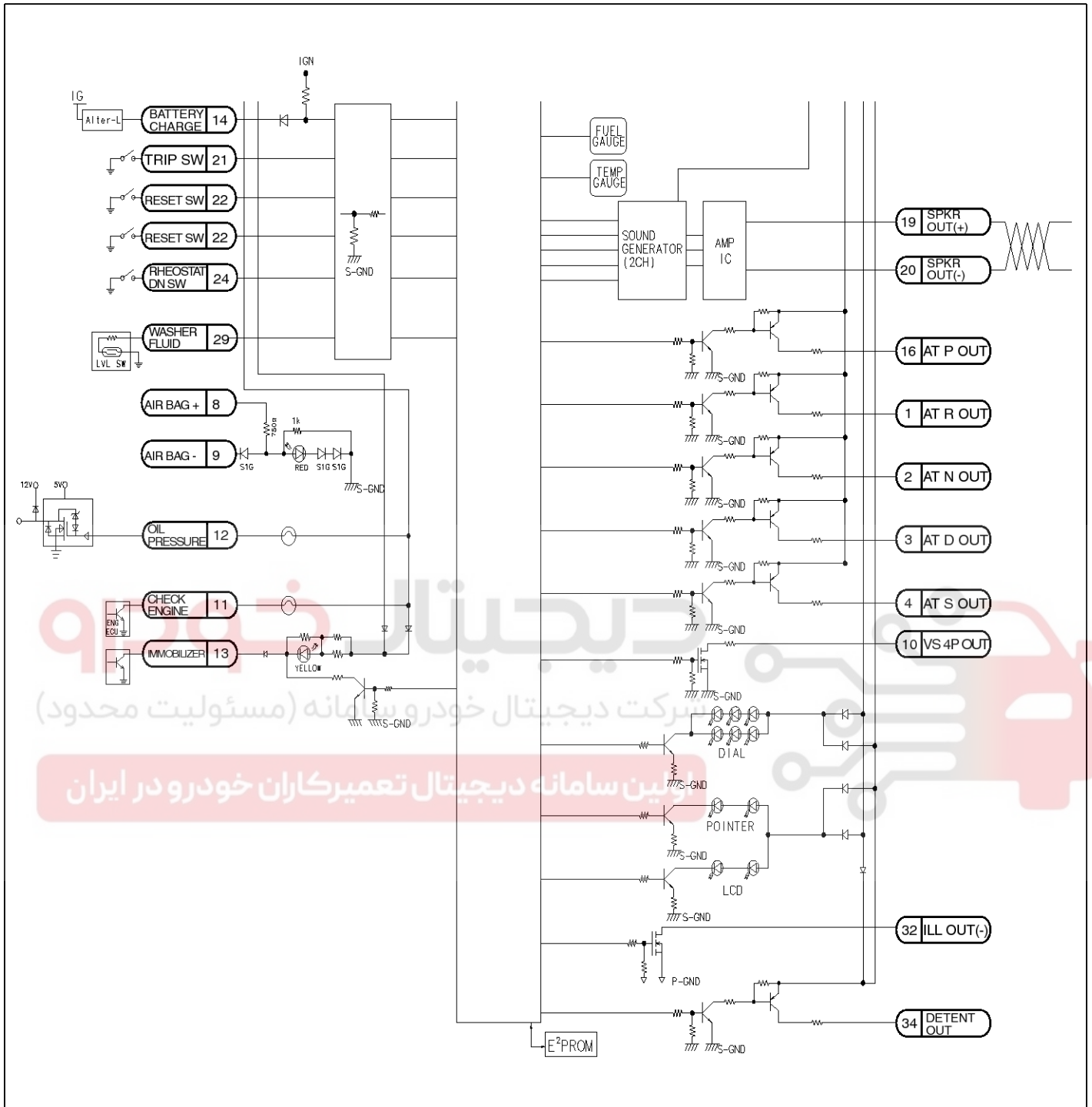


SVGBE0024L



# BE-340

# Body Electrical System



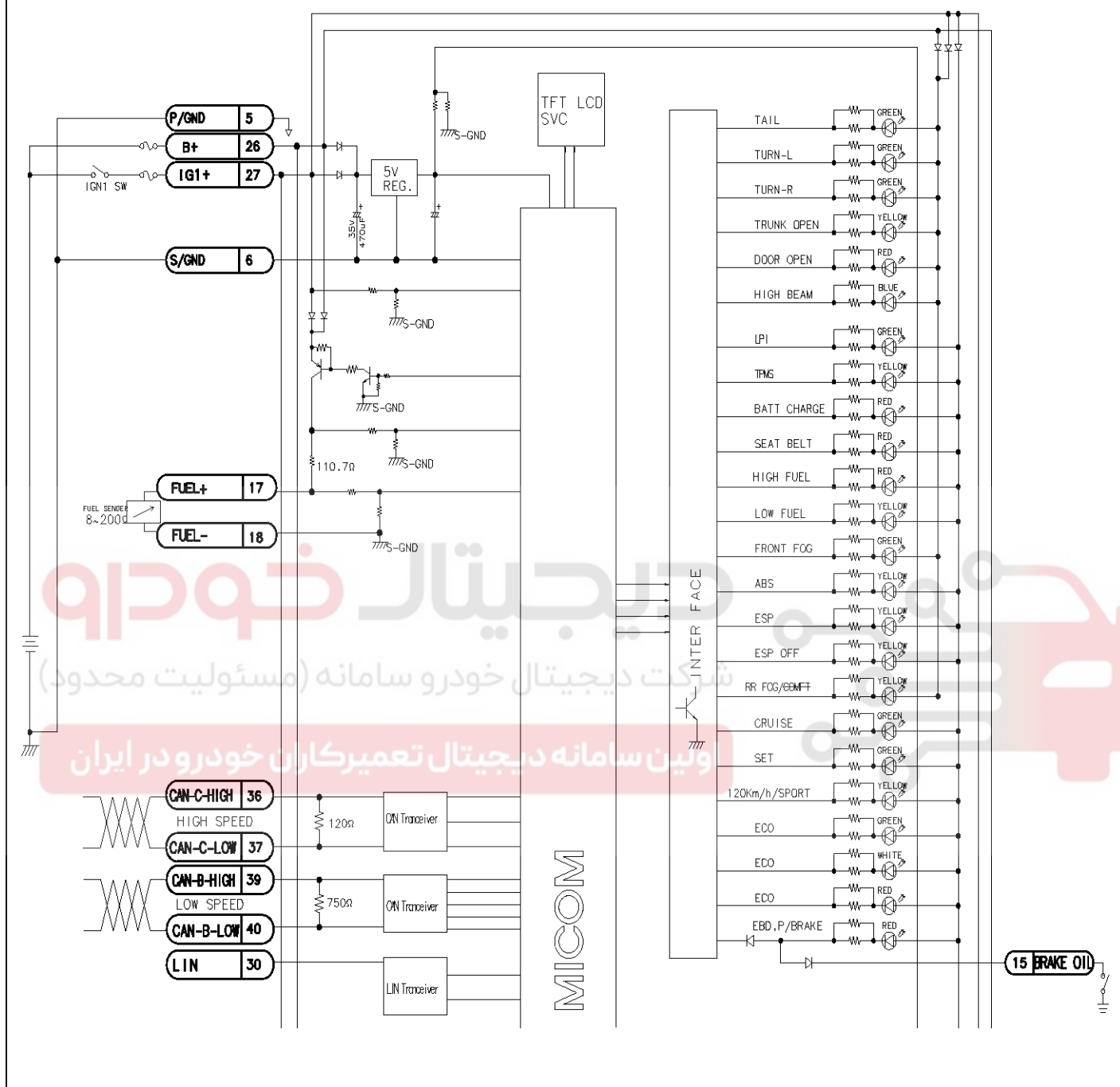
SVGBE0389L



# Indicators And Gauges

# BE-341

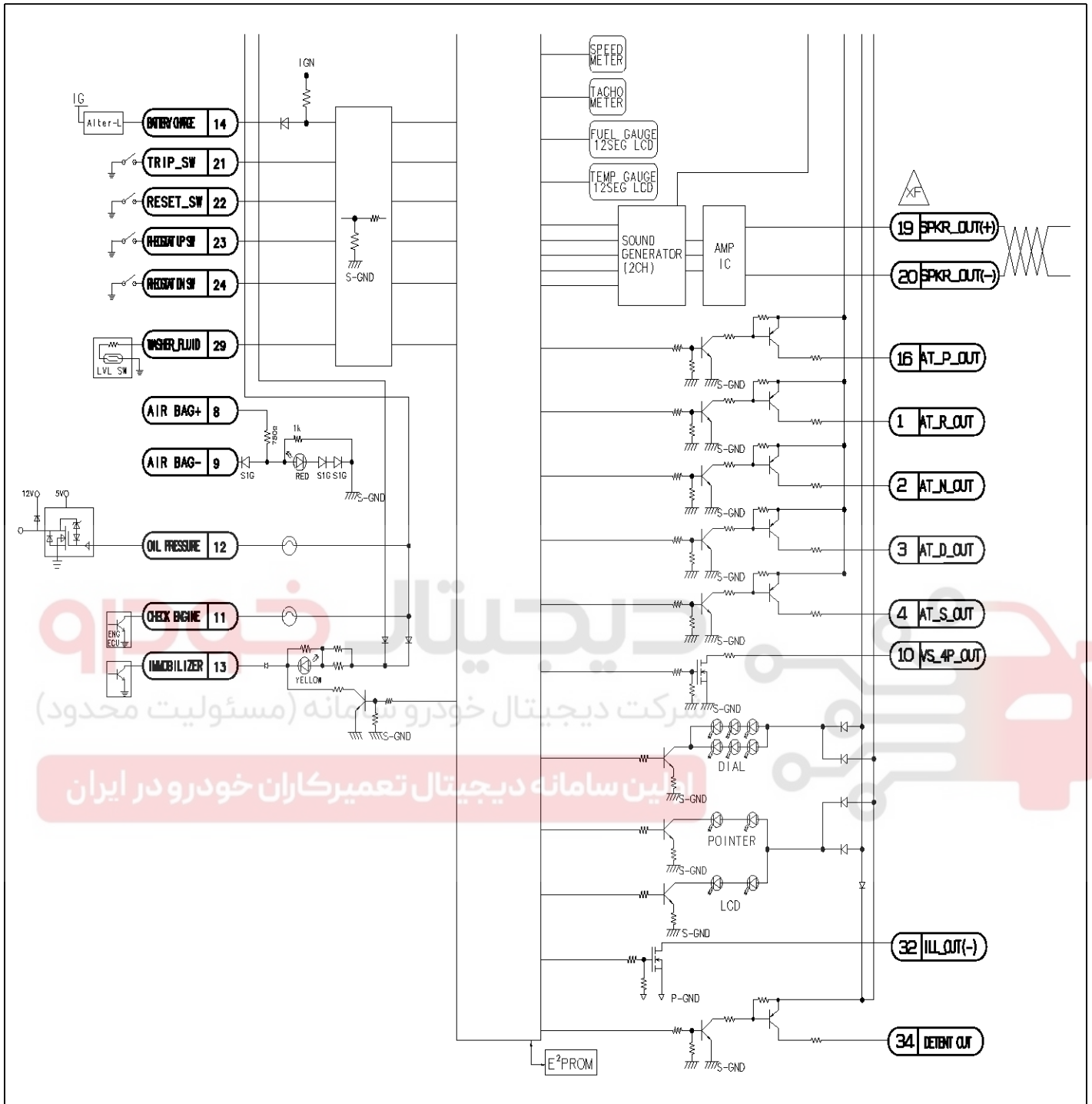
[Supervision]



SVGBE0025L

# BE-342

# Body Electrical System



SVGBE0390L

# Indicators And Gauges

## BE-343

### Inspection

#### Speedometer

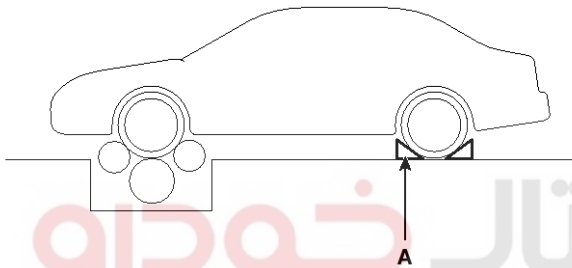
1. Adjust the pressure of the tires to the specified level.
2. Drive the vehicle onto a speedometer tester. Use wheel chocks (A) as appropriate.
3. Check if the speedometer indicator range is within the standard values.

**⚠ CAUTION**

Do not operate the clutch suddenly or increase/ decrease speed rapidly while testing.

**📢 NOTICE**

Tire wear and tire over or under inflation will increase the indication error.



[km/h]

| Velocity (km/h) | Tolerance (km/h) | Velocity (km/h) | Tolerance (km/h) |
|-----------------|------------------|-----------------|------------------|
| 20              | +3.73<br>-0.29   | 160             | +5.65<br>+1.63   |
| 40              | +4.00<br>-0.01   | 180             | +5.93<br>+1.91   |
| 60              | +4.28<br>+0.26   | 200             | +6.20<br>+2.18   |
| 80              | +4.55<br>+0.54   | 220             | +6.48<br>+2.46   |
| 100             | +4.83<br>+0.81   | 240             | +6.75<br>+2.37   |
| 120             | +5.10<br>+1.36   | 260             | +7.03<br>+3.01   |
| 140             | +5.38<br>+1.36   |                 |                  |

[MPH]

| Velocity (MPH) | Tolerance (MPH) | Velocity (MPH) | Tolerance (MPH) |
|----------------|-----------------|----------------|-----------------|
| 20             | +2.25<br>-0.22  | 120            | +3.15<br>+0.68  |
| 40             | +2.43<br>-0.04  | 140            | +3.34<br>+0.86  |
| 60             | +2.61<br>+0.14  | 160            | +3.52<br>+1.04  |
| 80             | +2.79<br>+0.32  |                |                 |
| 100            | +2.97<br>+0.50  |                |                 |

#### Tachometer

1. Connect the GDS to the diagnostic link connector or install a tachometer.
2. With the engine started, compare the readings of the tester with that of the tachometer. Replace the tachometer if the tolerance is exceeded.

**⚠ CAUTION**

1. Reversing the connections of the tachometer will damage the transistor and diodes inside.
2. When removing or installing the tachometer, be careful not to drop it or subject it to severe shock.

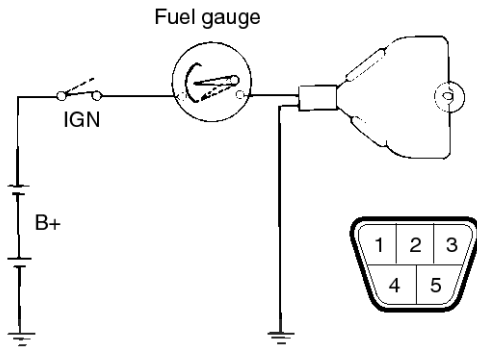
| Revolution (rpm) | Tolerance (rpm) | Revolution (rpm) | Tolerance (rpm) |
|------------------|-----------------|------------------|-----------------|
| 1,000            | ±100            | 5,000            | ±100            |
| 2,000            | ±100            | 6,000            | ±100            |
| 3,000            | ±100            | 7,000            | ±100            |
| 4,000            | ±100            | 8,000            | ±100            |

# BE-344

# Body Electrical System

## Fuel Gauge

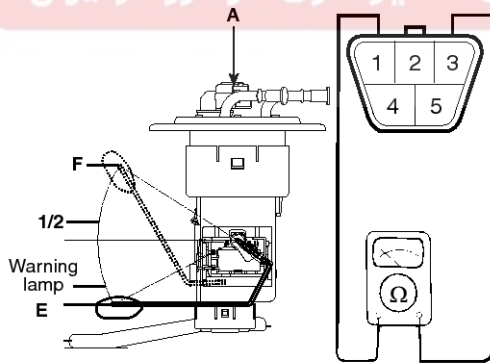
1. Disconnect the fuel sender connector from the fuel sender.
2. Connect a 3.4 watt, 12V test bulb to terminals 1 and 3 on the wire harness side connector.
3. Turn the ignition switch to the ON, and then check that the bulb lights up and the fuel gauge needle moves to full.



SYFBE0156L

## Main Fuel Gauge Sender

1. Using an ohmmeter, measure the resistance between terminals 1 and 3 of sender connector (A) at each float level.



SYFBE0157L

2. Also check that the resistance changes smoothly when the float is moved from "E" to "F"

### [Standard - Gasoline]

| Position         | Gauge angle (°) | Resistance (Ω) |
|------------------|-----------------|----------------|
| E                | 0               | 184 ± 2Ω       |
| Warning lamp ON  | 4               | 170 ± 2Ω       |
| Warning lamp OFF | 6               | -              |
| 1/2              | 66              | 66 ± 2Ω        |
| F                | 120             | 15 ± 2Ω        |

### [Supervision - Gasoline]

| Position         | Segment | Resistance (Ω) |
|------------------|---------|----------------|
| Warning lamp ON  | 1 SEG   | 170Ω ± 2Ω      |
| Warning lamp OFF | 2 SEG   | 146.7Ω         |
| 1/2              | 6 SEG   | 72.7Ω          |
| F                | 12 SEG  | 15Ω ± 1Ω       |

3. If the height resistance is unsatisfied, replace the fuel sender as an assembly.

### ⚠ CAUTION

After completing this test, wipe the sender dry and reinstall it in the fuel tank.

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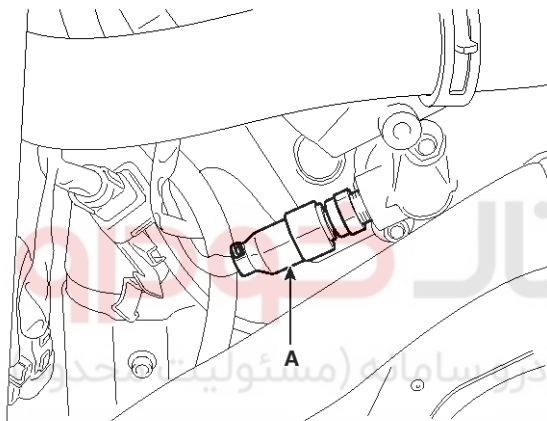
# Indicators And Gauges

## BE-345

### Engine Coolant Temperature Gauge

1. Disconnect the wiring connector (A) from the engine coolant temperature sender in the engine compartment.
2. Turn the ignition switch ON. Check that the gauge needle indicates cool. Turn the ignition switch OFF.
3. Connect a 12V, 3.4 watt test bulb between the harness side connector and ground.
4. Turn the ignition switch ON.
5. Verify that the test bulb flashes and that the indicator moves to HOT.

If operation is not as specified, replace the engine coolant temperature gauge. Then recheck the system.



SVGBE0029L

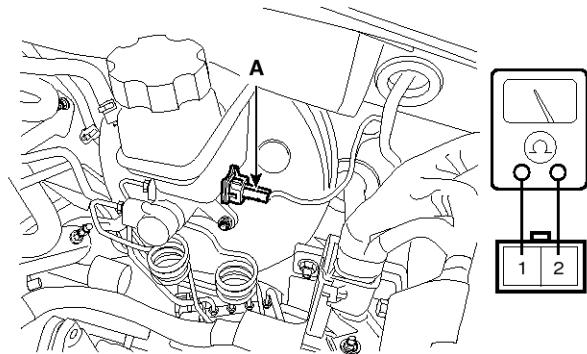
### Engine Coolant Temperature Sender

1. Using an ohmmeter, measure the resistance between the terminal 2 and ground.
2. If the resistance value is not as shown in the table, replace the temperature sender.

|                      |         |                    |          |
|----------------------|---------|--------------------|----------|
| Temperature [°F(°C)] | 131(55) | 160(71) ~ 230(110) | 257(125) |
| Gauge angle (°)      | -4.5    | 52.5               | 105      |

### Brake Fluid Level Warning Switch

1. Remove the connector (A) from the switch located at the brake fluid reservoir.
2. Verify that continuity exists between switch terminals 1 and 2 while pressing the switch (float) down with a rod.



SVGBE0028L

### Brake Fluid Level Warning Lamp

1. Ignition "ON"
2. Release the parking brake.
3. Remove the connector from the brake fluid level warning switch.
4. Ground the connector at the harness side.
5. Verify that the warning lamp lights.

# BE-346

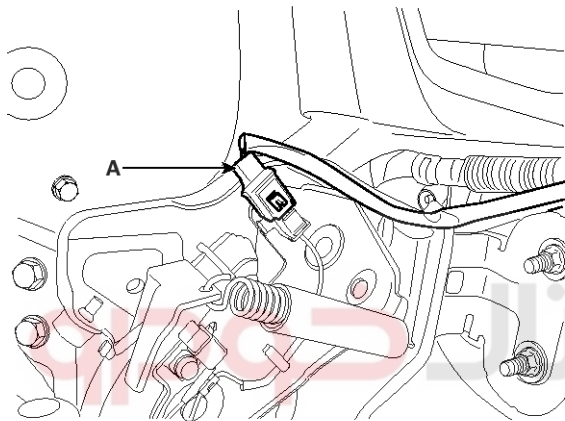
# Body Electrical System

## Parking Brake Switch

The parking brake switch (A) is a pulling type. It is located under the parking brake lever. To adjust, move the switch mount up and down with the parking brake lever released all the way.

1. Check that there is continuity between the terminal and switch body with the switch ON (Lever is pulled).
2. Check that there is no continuity between the terminal and switch body with the switch OFF (Lever is released).

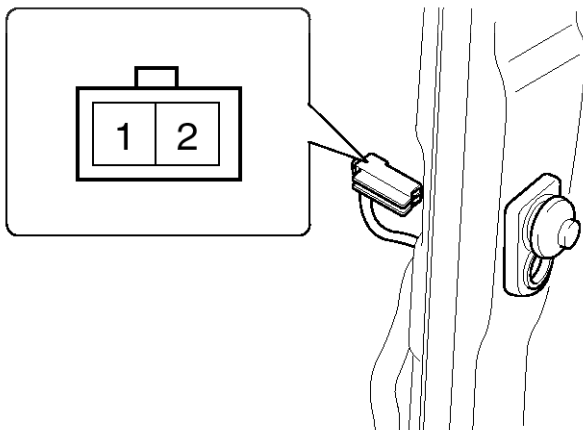
If continuity is not as specified, replace the switch or inspect its ground connection.



SYFBR0111D

## Door Switch

Remove the door switch and check for continuity between the terminals.



SHMBE8125D

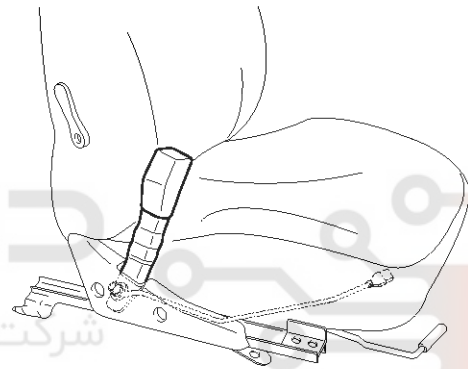
| Terminal / Position | 1 | 2 | Body (Ground) |
|---------------------|---|---|---------------|
| Free(Door open)     | ○ | ○ | ○             |
| Push(Door close)    |   |   |               |

ETQF180D

## Seat Belt Switch

1. Remove the connector from the switch.
2. Check for continuity between terminals.

| Seat belt condition | Continuity                        |
|---------------------|-----------------------------------|
| Fastened            | Non-conductive ( $\infty\Omega$ ) |
| Not fastened        | Conductive ( $\Omega$ )           |



V5BE060Q

## Seat Belt Warning Lamp

With the ignition switch turned ON, verify that the lamp glows.

| Seat belt condition | Warning lamp |
|---------------------|--------------|
| Fastened            | OFF          |
| Not fastened        | ON           |

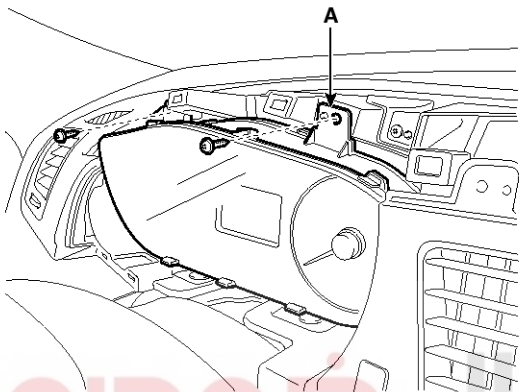
# Indicators And Gauges

## BE-347

### Removal

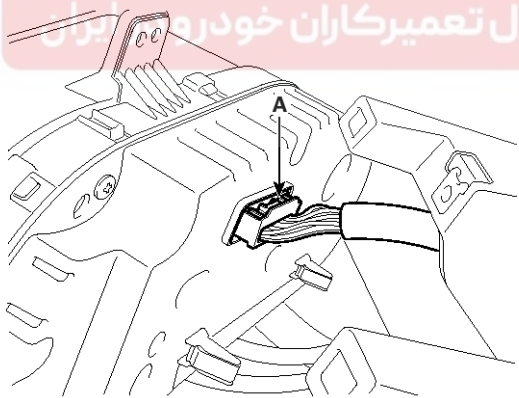
#### Instrument Cluster

1. Disconnect the negative (-) battery terminal.
2. Tilt the steering column down.
3. Remove the cluster facia panel after removing the screws.  
(Refer to BD group - "Crash pad")
4. Remove the instrument cluster (A) after loosening the screws.



SVGBD0108D

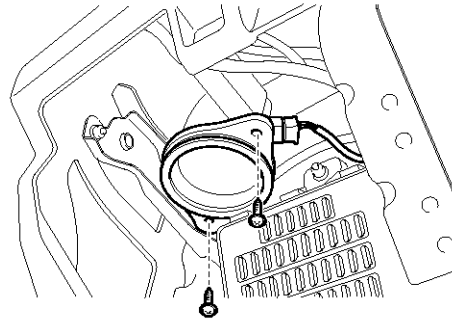
5. Disconnect the cluster connector (A), then remove the cluster.



SVGBD0109D

### Speaker

1. Remove the crash pad lower panel.  
(Refer to the BD group - "Crash pad")
2. Remove the speaker (A) after removing the screws (2EA) and connector.



SVGBE0369D

### Installation

#### Instrument Cluster

1. Install the cluster to the cluster housing.
2. Install the cluster fascia lower panel.

#### Speaker

1. Install the speaker after connecting the connector.
2. Install the crash pad lower panel.



## BE-348

## Body Electrical System

## Troubleshooting

| Symptom                                      | Possible cause                          | Remedy                           |
|----------------------------------------------|-----------------------------------------|----------------------------------|
| Speedometer does not operate                 | Cluster fuse (10A) blown                | Check for short and replace fuse |
|                                              | Speedometer faulty                      | Check speedometer                |
|                                              | CAN line faulty                         | Check the TCU                    |
|                                              | Wiring or ground faulty                 | Repair if necessary              |
| Tachometer does not operate                  | Cluster fuse (10A) blown                | Check for short and replace fuse |
|                                              | Tachometer faulty                       | Check tachometer                 |
|                                              | CAN line faulty                         | Check the TCU                    |
|                                              | Wiring or ground faulty                 | Repair if necessary              |
| Fuel gauge does not operate                  | Cluster fuse (10A) blown                | Check for short and replace fuse |
|                                              | Fuel gauge faulty                       | Check gauge                      |
|                                              | Fuel sender faulty                      | Check fuel sender                |
|                                              | Wiring or ground faulty                 | Repair if necessary              |
| Low fuel warning lamp does not light up      | Cluster fuse (10A) blown                | Check for short and replace fuse |
|                                              | Fuel level lamp faulty                  | Check fuel level lamp            |
|                                              | Fuel sender faulty                      | Check fuel sender                |
|                                              | Wiring or ground faulty                 | Repair if necessary              |
| Water temperature gauge does not operate     | Cluster fuse (10A) blown                | Check for short and replace fuse |
|                                              | Water temperature gauge faulty          | Check gauge                      |
|                                              | Water temperature sender faulty         | Check sender                     |
|                                              | CAN line faulty                         | Check the EMS                    |
|                                              | Wiring or ground faulty                 | Repair if necessary              |
| Oil pressure warning lamp does not light up  | Cluster fuse (10A) blown                | Check for short and replace fuse |
|                                              | Bulb burned out                         | Replace bulb                     |
|                                              | Oil pressure switch faulty              | Check switch                     |
|                                              | Wiring or ground faulty                 | Repair if necessary              |
| Parking brake warning lamp does not light up | Cluster fuse (10A) blown                | Check for short and replace fuse |
|                                              | Parking brake warning lamp faulty       | Check parking brake warning lamp |
|                                              | Brake fluid level warning switch faulty | Check switch                     |
|                                              | Parking brake switch faulty             | Check switch                     |
|                                              | Wiring or ground faulty                 | Repair if necessary              |
|                                              | CAN line faulty                         | Check the IPM                    |

# Indicators And Gauges

## BE-349

| Symptom                                                          | Possible cause                                | Remedy                                  |
|------------------------------------------------------------------|-----------------------------------------------|-----------------------------------------|
| Open door warning lamp and tailgate warning lamp do not light up | Memory fuse (15A) blown                       | Check for short and replace fuse        |
|                                                                  | Door warning and tailgate warning lamp faulty | Check warning and tailgate warning lamp |
|                                                                  | Door switch faulty                            | Check switch                            |
|                                                                  | Wiring or ground faulty                       | Repair if necessary                     |
|                                                                  | CAN line faulty                               | Check the IPM                           |
| Seat belt warning lamp does not light up                         | Cluster fuse (10A) blown                      | Check for short and replace fuse        |
|                                                                  | Speedometer and odometer faulty               | Check speedometer and odometer          |
|                                                                  | Seat belt switch faulty                       | Check switch                            |
|                                                                  | Wiring or ground faulty                       | Repair if necessary                     |
|                                                                  | CAN line faulty                               | Check the IPM                           |
| Speedometer and odometer does not operate                        | CAN line faulty                               | Check the ABS ECU                       |
|                                                                  | Seat belt warning lamp faulty                 | Check seat belt warning lamp            |

# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

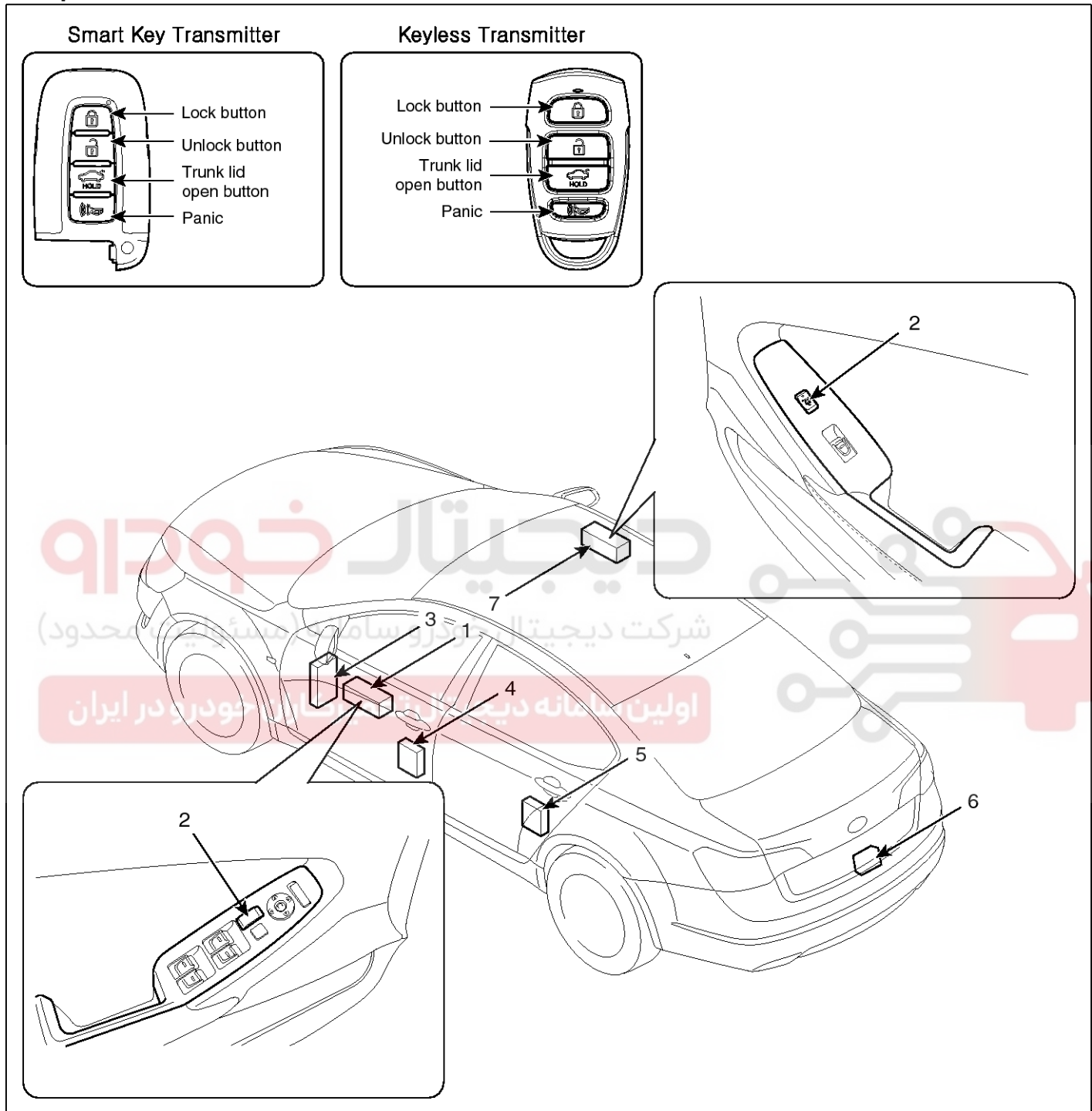


# BE-350

# Body Electrical System

## Power Door Locks

### Component Location



SVGBE0300L

- 1. Driver power window switch
- 2. Door lock switch
- 3. IPM(Intelligent intergrated Platform Module)
- 4. Front door lock actuator
- 5. Rear door lock actuator
- 6. Trunk lid open actuator
- 7. Assit power window switch

# Power Door Locks

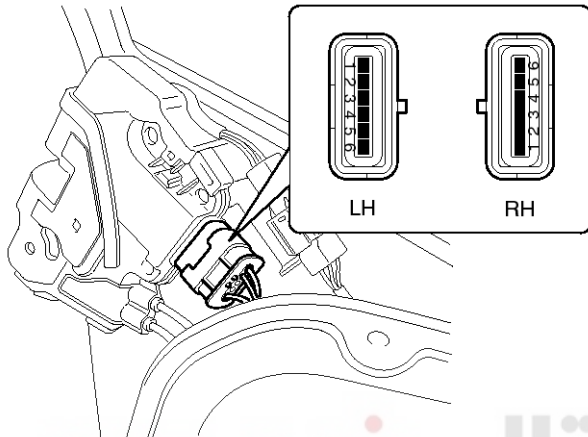
# BE-351

## Power Door Lock Actuators

### Inspection

#### Front Door Lock Actuator Inspection

1. Remove the front door trim.  
(Refer to the BD group - "Front door")
2. Remove the front door module.
3. Disconnect the 6P connector from the actuator.



SVGBE0092L

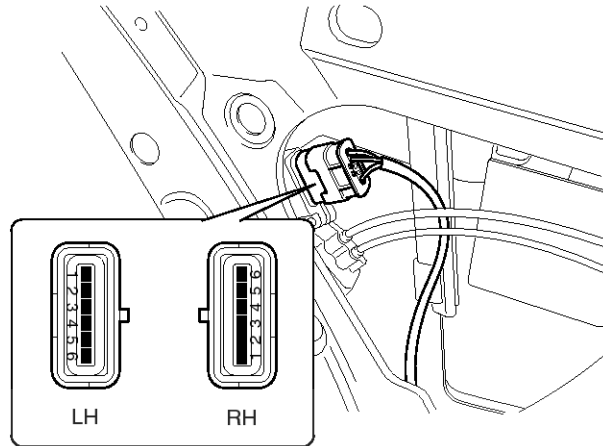
4. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

| Position    |        | Terminal |   |
|-------------|--------|----------|---|
|             |        | 2        | 1 |
| Front left  | Lock   | ⊕        | ⊖ |
|             | Unlock | ⊖        | ⊕ |
| Position    |        | Terminal |   |
|             |        | 6        | 5 |
| Front right | Lock   | ⊕        | ⊖ |
|             | Unlock | ⊖        | ⊕ |

SVGBE0094L

#### Rear Door Lock Actuator Inspection

1. Remove the rear door trim.  
(Refer to the BD group - "Rear door")
2. Remove the rear door module.
3. Disconnect the 6P connector from the actuator.



SVGBE0093L

4. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

| Position   |        | Terminal |   |
|------------|--------|----------|---|
|            |        | 2        | 1 |
| Rear left  | Lock   | ⊕        | ⊖ |
|            | Unlock | ⊖        | ⊕ |
| Position   |        | Terminal |   |
|            |        | 6        | 5 |
| Rear right | Lock   | ⊕        | ⊖ |
|            | Unlock | ⊖        | ⊕ |

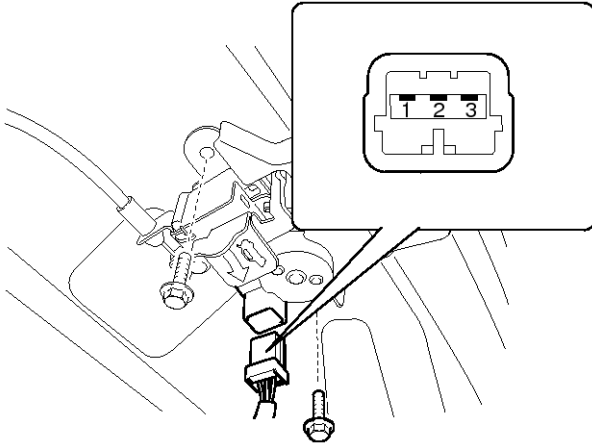
SVGBE0095L

# BE-352

# Body Electrical System

## Trunk Lid Release Actuator Inspection

1. Remove the trunk lid trim panel.  
(Refer to the BD group - "Trunk lid")
2. Disconnect the 3P connector from the actuator.



SVGBE0136D

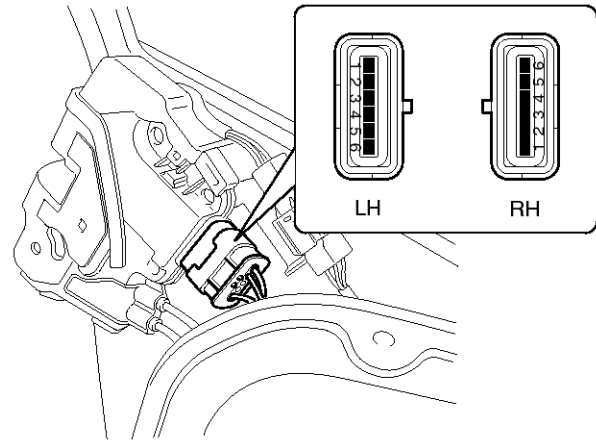
3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

| Position \ Terminal | 1 | 2 |
|---------------------|---|---|
| Open                | ⊖ | ⊕ |
| Close               | — | — |

SVGBE0096L

## Front Door Lock Switch Inspection

1. Remove the front door trim panel.  
(Refer to the BD group - "Front door")
2. Remove the front door module.
3. Disconnect the 6P connector from the actuator.



SVGBE0092L

4. Check for continuity between the terminals in each switch position when inserting the key into the door according to the table.

| Position \ Terminal  | 5     | 6     |
|----------------------|-------|-------|
| Front Left \ Unlock  | ○ — ○ | ○ — ○ |
| Position \ Terminal  | 1     | 2     |
| Front Right \ Unlock | ○ — ○ | ○ — ○ |

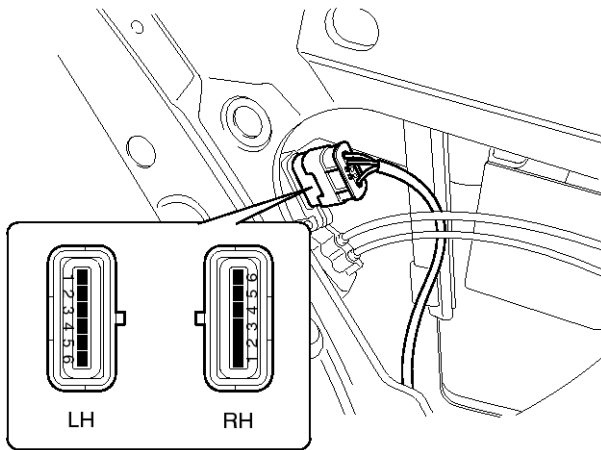
SVGBE0097L

# Power Door Locks

# BE-353

## Rear Door Lock Switch Inspection

1. Remove the rear door trim panel.  
(Refer to the BD group - "Rear door")
2. Remove the rear door module.
3. Disconnect the 6P connector from the actuator.



SVGBE0093L

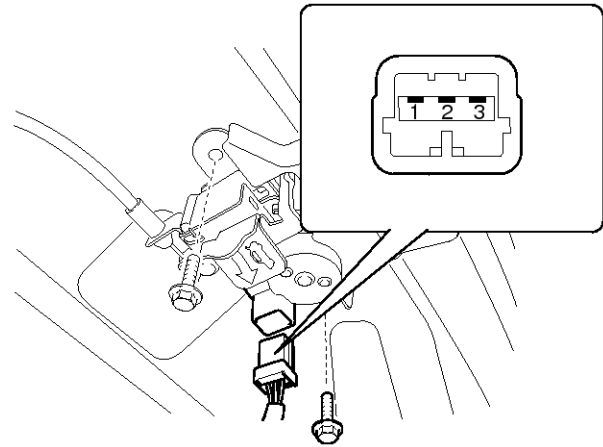
4. Check for continuity between the terminals in each switch position according to the table.

|            |        | Terminal |   |
|------------|--------|----------|---|
|            |        | 5        | 6 |
| Rear Left  | Unlock | ○        | ○ |
|            |        | Terminal |   |
|            |        | 1        | 2 |
| Rear Right | Unlock | ○        | ○ |

SVGBE0098L

## Trunk Lid Open Switch Inspection

1. Remove the trunk lid trim.  
(Refer to the BD group - "Trunk lid")
2. Disconnect the 3P connector from the actuator.



SVGBE0136D

3. Check for continuity between the terminals in each switch position according to the table.

|       |  | Terminal |   |
|-------|--|----------|---|
|       |  | 1        | 3 |
| Open  |  | ○        | ○ |
| Close |  |          |   |

SVGBE0099L

# BE-354

# Body Electrical System

## Power Door Lock Switch

### Inspection

#### Diagnosis With GDS

1. It will be able to diagnose defects of DDM/ADM with GDS quickly. GDS can operate actuator forcefully, input/output value monitoring and self diagnosis.
2. Select model and "IPM".

3. Select the "DDM (Power window main)" to check.
4. Select "Input/output monitoring", if you will check current data of power door lock system. It provides input/output status of DDM/ADM.

The screenshot shows the 'Current Data' window in GDS software. At the top, there are control buttons: 'Standard Display', 'Full List', 'Graph', 'Items List', 'Reset Min.Max.', 'Record', and 'Stop'. Below these is a table with columns for 'Sensor Name', 'Value', and 'Unit'. The table lists eight mirror switches, all of which are currently 'OFF'.

| Sensor Name                                                             | Value | Unit |
|-------------------------------------------------------------------------|-------|------|
| <input type="checkbox"/> Drive side Outside Mirror UP Switch on/off     | OFF   | -    |
| <input type="checkbox"/> Drive side Outside Mirror DOWN Switch on/off   | OFF   | -    |
| <input type="checkbox"/> Drive side Outside Mirror Left Switch on/off   | OFF   | -    |
| <input type="checkbox"/> Drive side Outside Mirror Right Switch on/off  | OFF   | -    |
| <input type="checkbox"/> Assist side Outside Mirror UP Switch on/off    | OFF   | -    |
| <input type="checkbox"/> Assist side Outside Mirror DOWN Switch on/off  | OFF   | -    |
| <input type="checkbox"/> Assist side Outside Mirror Left Switch on/off  | OFF   | -    |
| <input type="checkbox"/> Assist side Outside Mirror Right Switch on/off | OFF   | -    |

The screenshot shows the 'Current Data' window in GDS software. At the top, there are control buttons: 'Standard Display', 'Full List', 'Graph', 'Items List', 'Reset Min.Max.', 'Record', and 'Stop'. Below these is a table with columns for 'Sensor Name', 'Value', and 'Unit'. The table lists various sensors, including door lock switches and a mirror position sensor.

| Sensor Name                                                                    | Value  | Unit |
|--------------------------------------------------------------------------------|--------|------|
| <input type="checkbox"/> Assist Side Door Unlock                               | UNLOCK | -    |
| <input type="checkbox"/> Door lock switch on in P/PWDW Switch                  | OFF    | -    |
| <input type="checkbox"/> Door unlock switch on in P/PWDW Switch                | OFF    | -    |
| <input type="checkbox"/> IGN1 Switch on/off                                    | OFF    | -    |
| <input type="checkbox"/> Assist Pwdw Up Output on                              | OFF    | -    |
| <input type="checkbox"/> Assist Pwdw Down Output on                            | OFF    | -    |
| <input type="checkbox"/> Assist Pwdw Auto Down Output on                       | OFF    | -    |
| <input type="checkbox"/> Assist side Mirror Horizontal position sensor voltage | 2260   | mV   |

SVGBE0397L



# Power Door Locks

# BE-355

- If you will check the power door lock operation forcefully, select "Actuation test".

☑ Actuation Test
☰

| Test Items                                           |  |
|------------------------------------------------------|--|
| Operate DRIVE SIDE WINDOW AUTO UP                    |  |
| Operate DRIVE SIDE WINDOW AUTO DOWN                  |  |
| Operate DRIVE SIDE WINDOW UP                         |  |
| Operate DRIVE SIDE WINDOW DOWN                       |  |
| Move DRIVE OUTSIDE MIRROR to the highest position    |  |
| Move DRIVE OUTSIDE MIRROR to the lowest position     |  |
| Move DRIVE OUTSIDE MIRROR to the most left position  |  |
| Move DRIVE OUTSIDE MIRROR to the most right position |  |
| Operate DRIVE SIDE FOLD                              |  |
| Operate DRIVE SIDE UNFOLD                            |  |
| DRIVE SIDE DOOR UNLOCK                               |  |
| Central door lock                                    |  |
| Central door unlock                                  |  |
|                                                      |  |
|                                                      |  |

● Duration

● Conditions

● Result

SVGBE0398L

- To check the DTC of the DDM/AMD module, select "Diagnostic trouble codes"

☑ DTC
☰

| Description           | State |
|-----------------------|-------|
| - DTC NOT Supported - |       |
|                       |       |
|                       |       |
|                       |       |
|                       |       |
|                       |       |
|                       |       |

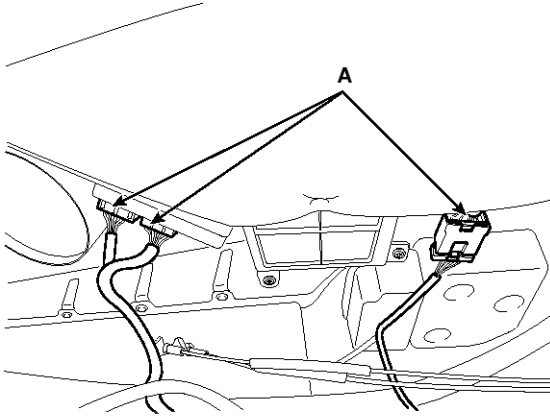
SVIBE9263L

## BE-356

## Body Electrical System

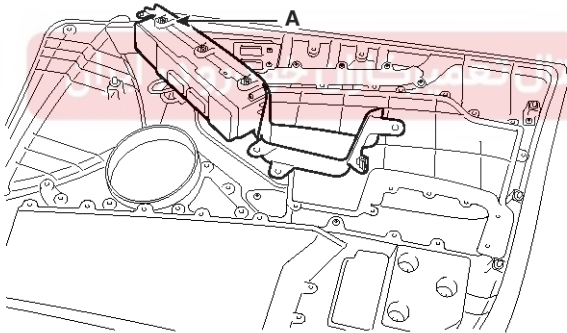
### Removal

1. Disconnect the negative(-) battery terminal.
2. Remove the front door trim panel.  
(Refer to the BD group - "Front door")
3. Disconnect the power window switch module connector (A) from the wiring harness.



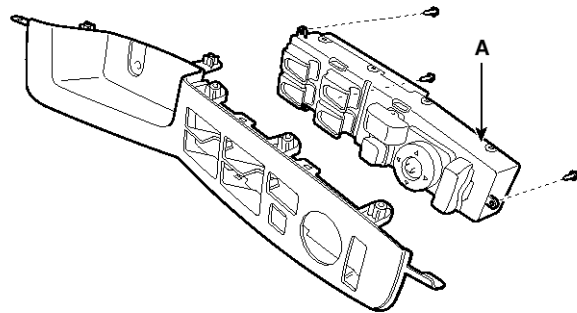
SVGB10089D

4. Remove the power window switch module (A) from the door trim after loosening the mounting screws (13EA).



SVGBE0339D

5. Remove the module (A) from the sub box assembly after loosening the mounting screw (3EA).



SVGBE0340D

### NOTICE

- Be careful not to damage door trim panel and door module mounting hooks.

### Installation

1. Install the power window switch module.
2. Install the door trim panel after reconnecting the relevant connectors

### NOTICE

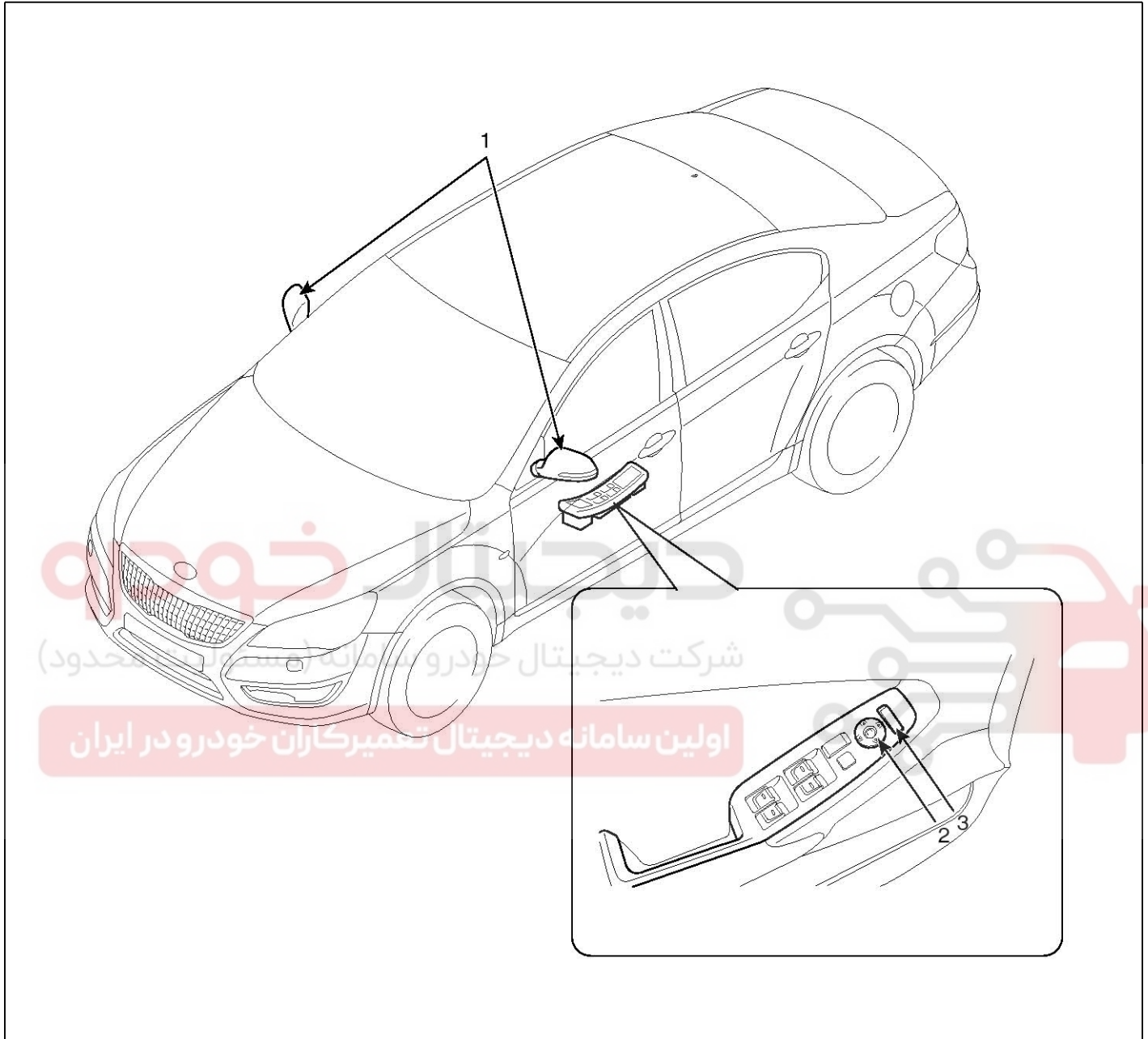
- Make sure that the power window switch module connectors are plugged properly.
- Check that the power window switch and door lock switch operate normally.

# Power Door Mirrors

# BE-357

## Power Door Mirrors

### Component Location



SVGBE0337D

- 1. Power door mirror
- 2. Power door mirror switch

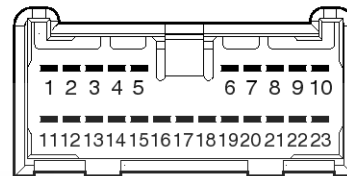
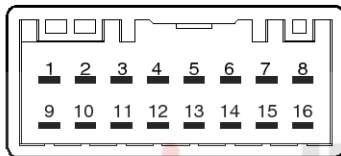
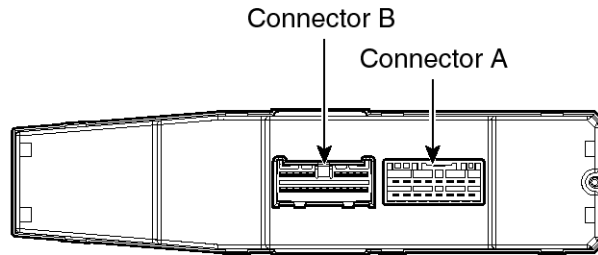
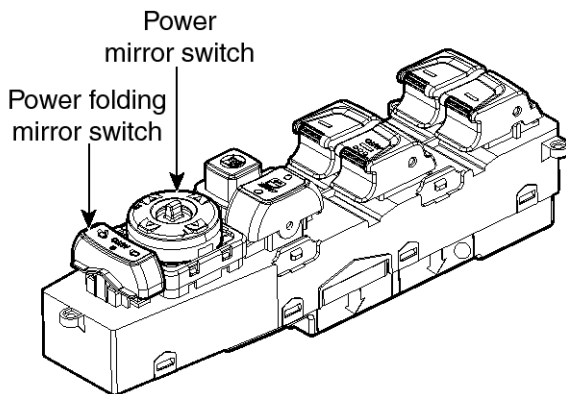
- 3. Power folding mirror switch

# BE-358

# Body Electrical System

## Power Out Side Mirror Switch

### Component



| No. | Connector A               | No. | Connector B                |
|-----|---------------------------|-----|----------------------------|
| 1   | ECU GND                   | 1   | CAN high                   |
| 2   | -                         | 2   | CAN low                    |
| 3   | IGN1 (back up lamp)       | 3   | Power (Safety window)      |
| 4   | Battery (+)               | 4   | Down (Safety window)       |
| 5   | -                         | 5   | SET switch (IMS)           |
| 6   | Mirror unfolding          | 6   | Crash input                |
| 7   | Mirror folding            | 7   | -                          |
| 8   | Power GND                 | 8   | Auto (Safety window)       |
| 9   | Mirror motor (vertical)   | 9   | Mirror sensor Vcc          |
| 10  | Mirror motor (horizontal) | 10  | -                          |
| 11  | Mirror motor (center)     | 11  | Switch 2 (IMS)             |
| 12  | Puddle lamp               | 12  | Switch 1 (IMS)             |
| 13  | Door lock motor           | 13  | Door unlock switch         |
| 14  | Door unlock motor         | 14  | -                          |
| 15  | Battery (+) power         | 15  | Mirror sensor (horizontal) |
| 16  | Battery (+) mirror        | 16  | Mirror sensor (vertical)   |
|     |                           | 17  | -                          |
|     |                           | 18  | -                          |
|     |                           | 19  | Trunk open switch          |
|     |                           | 20  | Up (Safety window)         |
|     |                           | 21  | -                          |
|     |                           | 22  | -                          |
|     |                           | 23  | Sensor GND                 |

SVGBE0301L

# Power Door Mirrors

## BE-359

### Inspection

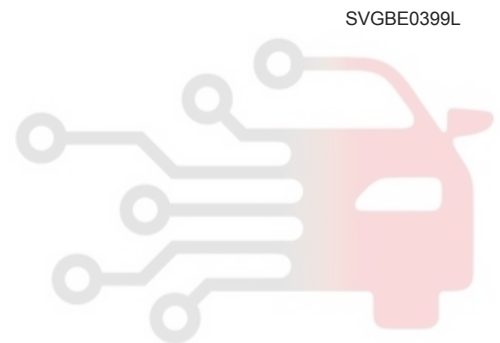
1. The DDM inputs can be checked using the GDS.
2. To check the input value of door lock switch, select option "IPM".
3. Select option "DDM (Driver Door Module)".
4. Select option "Input/Output monitoring".

| Current Data                                                            |       |      |
|-------------------------------------------------------------------------|-------|------|
| Sensor Name                                                             | Value | Unit |
| <input type="checkbox"/> Drive side Outside Mirror UP Switch on/off     | OFF   | -    |
| <input type="checkbox"/> Drive side Outside Mirror DOWN Switch on/off   | OFF   | -    |
| <input type="checkbox"/> Drive side Outside Mirror Left Switch on/off   | OFF   | -    |
| <input type="checkbox"/> Drive side Outside Mirror Right Switch on/off  | OFF   | -    |
| <input type="checkbox"/> Assist side Outside Mirror UP Switch on/off    | OFF   | -    |
| <input type="checkbox"/> Assist side Outside Mirror DOWN Switch on/off  | OFF   | -    |
| <input type="checkbox"/> Assist side Outside Mirror Left Switch on/off  | OFF   | -    |
| <input type="checkbox"/> Assist side Outside Mirror Right Switch on/off | OFF   | -    |

# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



SVGBE0399L

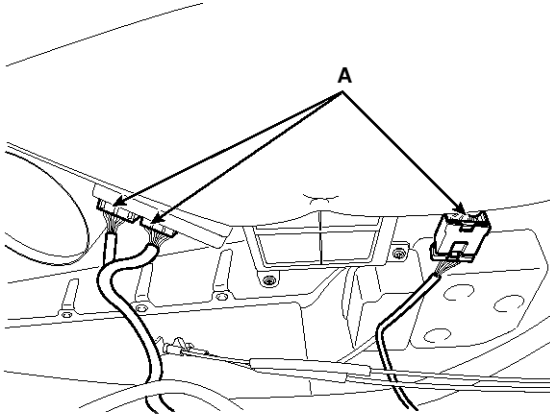


# Power Door Mirrors

# BE-361

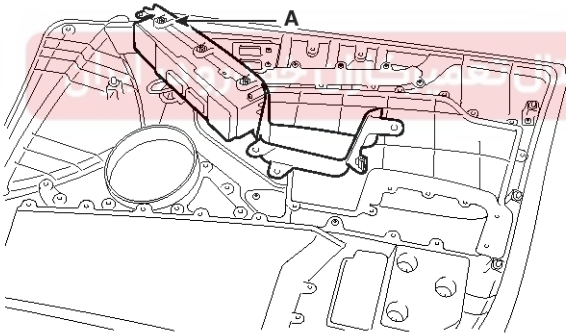
## Removal

1. Disconnect the negative(-) battery terminal.
2. Remove the front door trim panel.  
(Refer to the BD group - "Front door")
3. Disconnect the power window switch module connector (A) from the wiring harness.



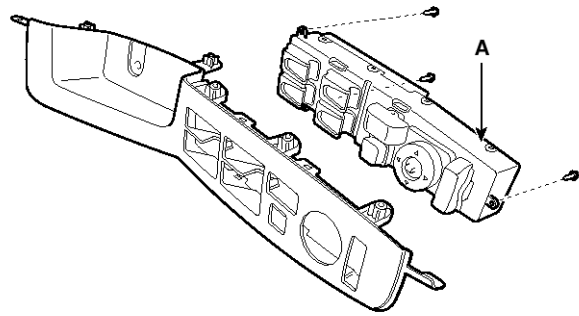
SVGB10089D

4. Remove the power window switch module (A) from the door trim after loosening the mounting screws (13EA).



SVGBE0339D

5. Remove the module (A) from the sub box assembly after loosening the mounting screw (3EA).



SVGBE0340D

## NOTICE

- Be careful not to damage door trim panel and door module mounting hooks.

## Installation

1. Install the power window switch module.
2. Install the door trim panel after reconnecting the relevant connectors

## NOTICE

- Make sure that the power window switch module connectors are plugged properly.
- Check that the power window switch and door lock switch operate normally.



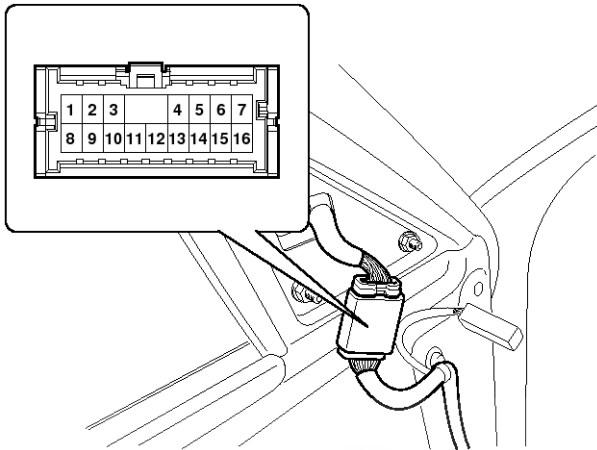
# BE-362

# Body Electrical System

## Power Door Mirror Actuator

### Inspection

1. Remove the front door quadrant delta cover.  
(Refer to the BD group - "Front door")
2. Disconnect the power door mirror connector from the harness.



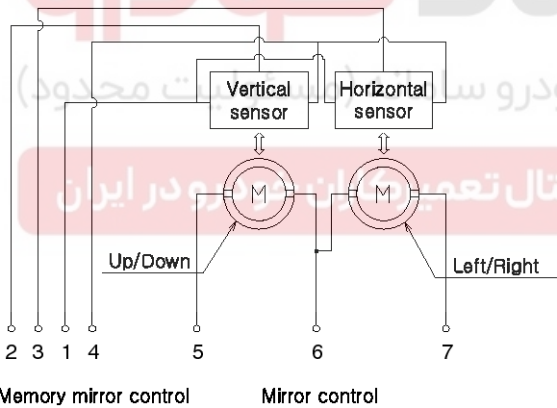
SVGBE0341D

3. Apply battery voltage to each terminal as shown in the table and verify that the mirror operates properly.

| Direction | 7     | 6 | 5 | B | GND | 4 | 1 | 3 | 2 |
|-----------|-------|---|---|---|-----|---|---|---|---|
| LH        | UP    | ○ | ○ | ○ | ○   | + | - |   | ▲ |
|           | Down  | ○ | ○ | ○ | ○   |   |   |   | ▼ |
|           | OFF   | ○ | ○ | ○ | ○   |   |   |   |   |
|           | Right | ○ | ○ | ○ | ○   | + | - |   | ▲ |
|           | Left  | ○ | ○ | ○ | ○   |   |   |   | ▼ |
| RH        | Up    | ○ | ○ | ○ | ○   | + | - |   | ▲ |
|           | Down  | ○ | ○ | ○ | ○   |   |   |   | ▼ |
|           | OFF   | ○ | ○ | ○ | ○   |   |   |   |   |
|           | Right | ○ | ○ | ○ | ○   | + | - |   | ▲ |
|           | Left  | ○ | ○ | ○ | ○   |   |   |   | ▼ |

▲ Increasing voltage  
▼ Decreasing voltage

SVGBE0304L



SVGBE0302L

# Power Door Mirrors

# BE-363

## Mirror Heater Inspection

|                      |    |    |
|----------------------|----|----|
| Terminal<br>Position | 10 | 11 |
| Heater               | ⊕  | ⊖  |

SVGBE0305L

## Puddle Lamp

|                      |    |    |
|----------------------|----|----|
| Terminal<br>Position | 14 | 13 |
| Lamp                 | ⊕  | ⊖  |

SVGBE0306L

## ECM

|                      |   |   |
|----------------------|---|---|
| Terminal<br>Position | 9 | 8 |
| Lamp                 | ⊕ | ⊖ |

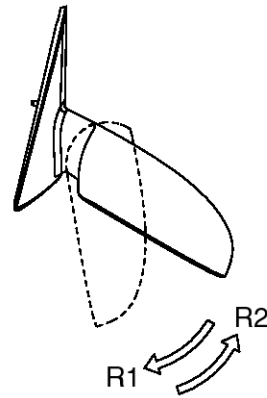
SVGBE0308L

## Side Repeater Lamp

|                      |    |    |
|----------------------|----|----|
| Terminal<br>Position | 12 | 11 |
| OEC                  | ⊕  | ⊖  |

SVGBE0309L

## Folding Mirror



ETJA055B

|                      |       |         |   |   |
|----------------------|-------|---------|---|---|
| Terminal<br>Position | B (+) | GND (-) | 8 | 9 |
| Folding (R1)         | ○     | ○       | ○ | ○ |
| Unfolding (R2)       | ○     | ○       | ○ | ○ |

SVGBE0303L

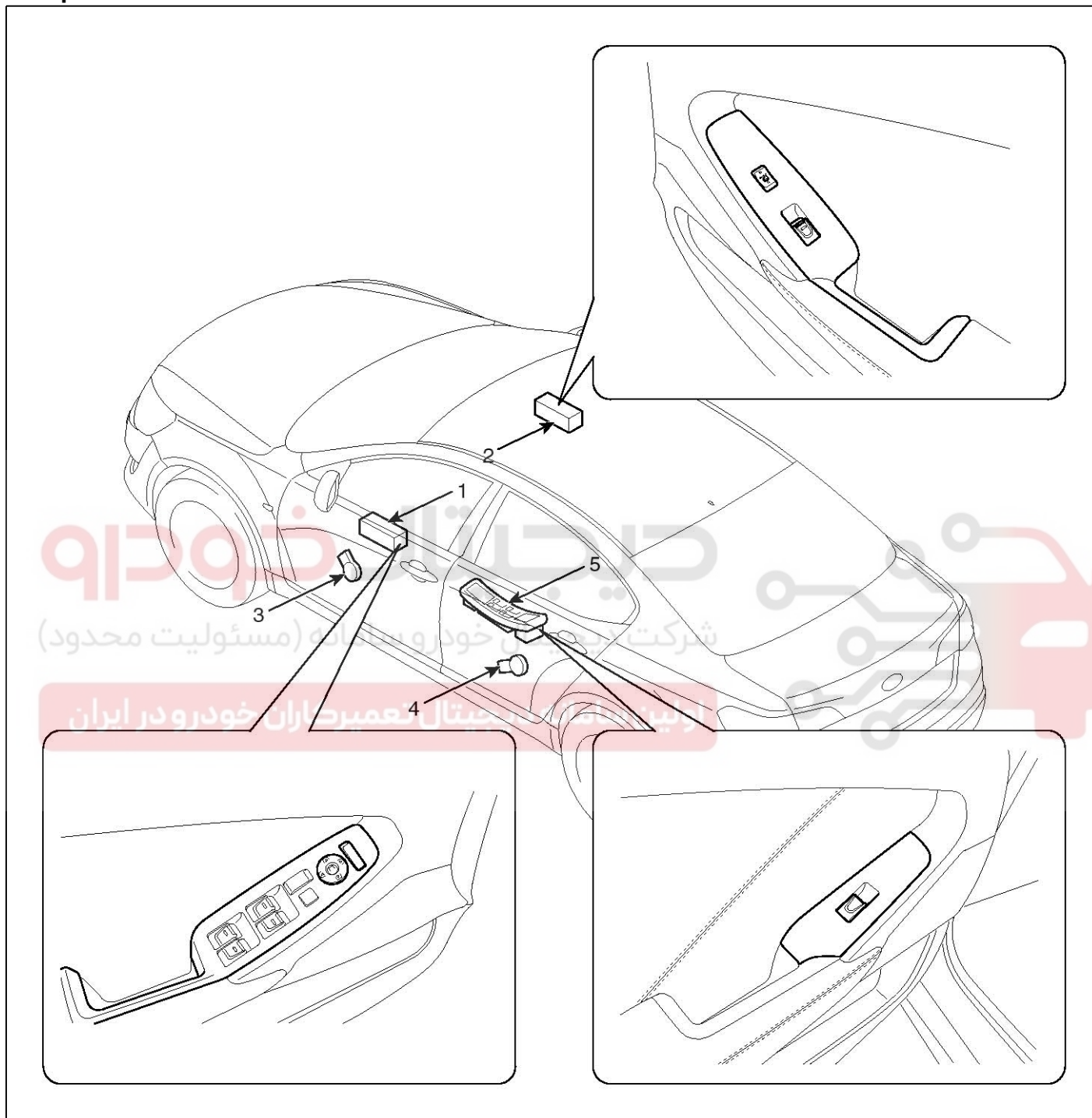


## BE-364

## Body Electrical System

## Power Windows

## Component Location



SVGBE0318D

1. Driver power window main switch
2. Passenger power window switch
3. Front window motor

4. Rear window motor
5. Rear window switch

# Power Windows

# BE-365

## Function Of Safety Power Window

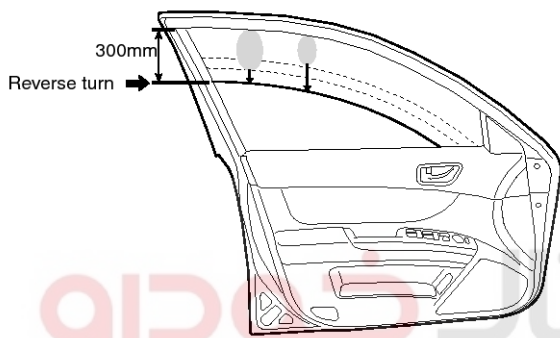
When driver door power window auto-up switch is operated, safety function is activated.

### 1. Safety function condition

When detect the force of 100N (using the 10N/mm spring) during the window rising, window is reversed.

### 2. Length of window reversing (except holding the auto-up switch)

- When detect the jamming during the 4mm ~ 250mm from top of the door.  
→ Window is reversed until 300mm from top of the door.

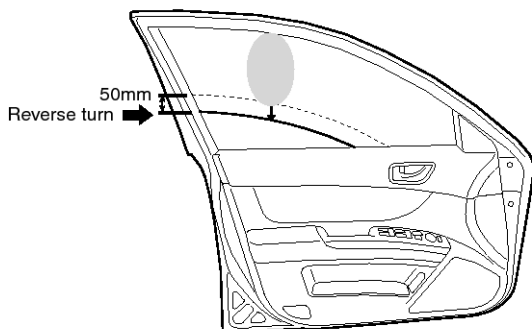


When detect the jamming during the 4mm~250mm from top of the door

ETRF320B

- When detect the jamming over the 250mm from top of the door.

→ Window is reversed until 20mm from jamming position.

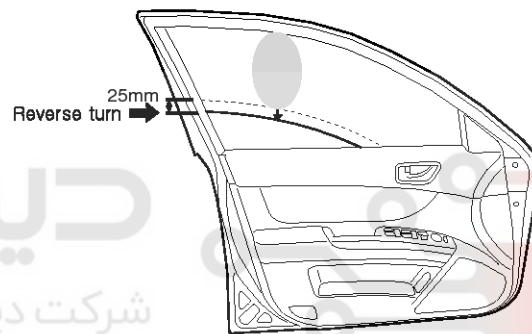


When detect the jamming over the 250mm from top of the door

ETRF320C

### 3. Length of window reversing (holding the auto-up switch)

- When detect the jamming during holding the auto-up switch.  
→ Window is reverse until 25mm from jamming position.
- Auto-up function is not available during the 5 seconds from above condition.  
→ When holding the auto-up switch, window is operated as a manual-up function. (Safety function is not activated.)
- When holding the auto-up switch after 5 seconds from above condition.  
→ Window is reverse until 25mm from jamming position.



When holding the auto-up switch

ETRF320D

### 4. Safety function is not available area

Safety function is not available during the 4mm from top of the door.

**BE-366****Body Electrical System****Initializing Method Of The Safety Power Window**

## 1. Initializing of Battery Connection

When the battery is not connected the vehicle over the 5 minutes, safety power window switch need the initializing.

## 1) Power window operation before initializing

- Manual-Up/Down function is available
- Auto-Up function is not available  
(When holding the auto-up/down switch, window is operated as a manual-up/down.)

## 2) Initializing method

Close the window in window open position, and holding the switch in window full close position over the 0.2 second.

(If start the closing the window in window full close position, initializing could be failed.)

## 3) If initialize the safety power window in jamming status, could occur below conditions.

- Safety function is not available

## 2. Initializing of fail safe mode

## 1) If the window moved by compulsion and motor have a problem, power window switch could be entering the fail safe mode for user's safety.

## 2) Power window operation in fail mode

- Auto/Manual-Down function is available
- Auto/Manual-Up function is not available  
(When auto/manual-up is operated, window is rising 20mm and is stopped the moving.)



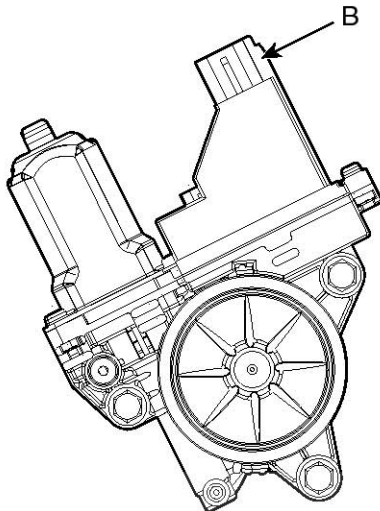
# Power Windows

# BE-367

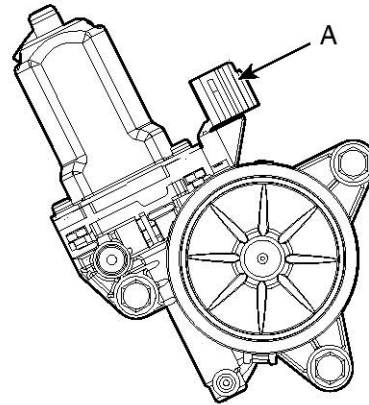
## Power Window Motor

### Circuit Diagram

[Safety Power Window]



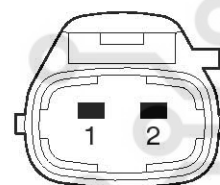
[General]



[Connector A]

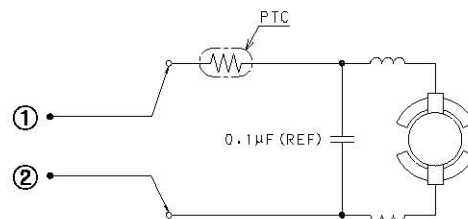
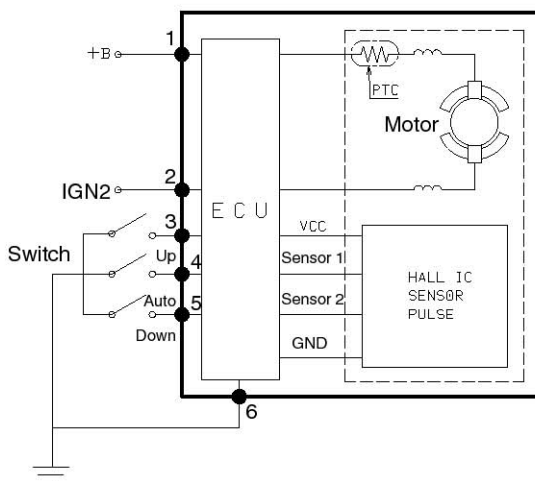


[Connector B]



| NO. | Description | NO. | Description |
|-----|-------------|-----|-------------|
| 1   | B+          | 4   | Up          |
| 2   | IGN 2       | 5   | Down        |
| 3   | Auto        | 6   | GND         |

| NO. | Description |
|-----|-------------|
| 1   | Up          |
| 2   | Down        |



SVGBE0310L



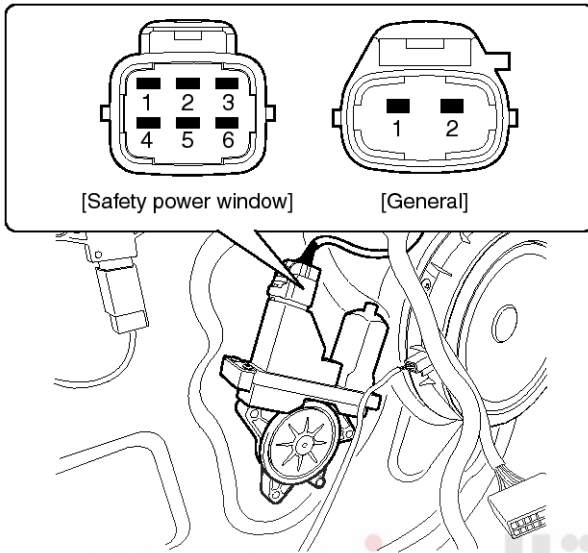
# BE-368

# Body Electrical System

## Inspection

### Front Power Window Motor Inspection

1. Remove the front door trim panel.  
(Refer to the BD group - "Front door")
2. Disconnect the connector from the motor.



SVGBE0311L

3. Connect the terminal No. 1 and No. 2 to battery voltage (12V) and terminal No. 6 to battery (-). And then check that the motor operates smoothly when connecting the terminals below.

If the operation is abnormal, replace the motor.

### [Safety Power Window]

| Terminal |      | 4     | 6 (GND) | 5     |
|----------|------|-------|---------|-------|
| Position |      |       |         |       |
| LH       | UP   | ○ — ○ | ○ — ○   |       |
|          | DOWN |       | ○ — ○   | ○ — ○ |
| RH       | DOWN | ○ — ○ | ○ — ○   |       |
|          | UP   |       | ○ — ○   | ○ — ○ |

SVGBE0312L

4. Connect the motor terminals directly to battery voltage (12V) and check that the motor operates smoothly. Next, reverse the polarity and check that the motor operates smoothly in the reverse direction. If the operation is abnormal, replace the motor.

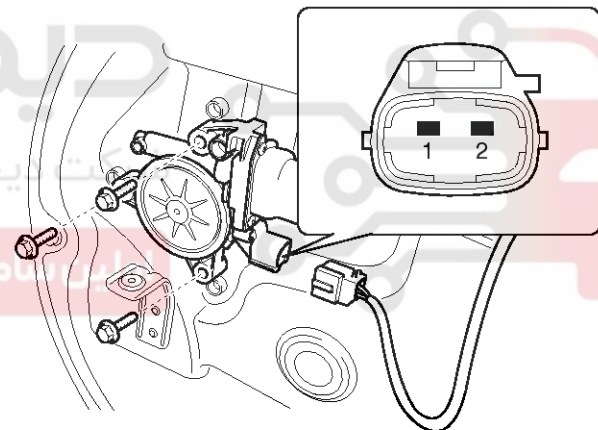
### [General]

| Terminal |      | 1                   | 2 |
|----------|------|---------------------|---|
| Position |      |                     |   |
| LH       | UP   | Clockwise ⊕         | ⊖ |
|          | DOWN | Counter-clockwise ⊖ | ⊕ |
| RH       | DOWN | Clockwise ⊕         | ⊖ |
|          | UP   | Counter-clockwise ⊖ | ⊕ |

SVGBE0332L

### Rear Power Window Motor Inspection

1. Remove the rear door trim panel.  
(Refer to the BD group - "Rear door")
2. Disconnect the 2P connector from the motor.



SVGBE0321D

3. Connect the motor terminals directly to battery voltage (12V) and check that the motor operates smoothly. Next, reverse the polarity and check that the motor operates smoothly in the reverse direction. If the operation is abnormal, replace the motor.

| Terminal |      | 1                   | 2 |
|----------|------|---------------------|---|
| Position |      |                     |   |
| LH       | UP   | Clockwise ⊖         | ⊕ |
|          | DOWN | Counter-clockwise ⊕ | ⊖ |
| RH       | DOWN | Counter-clockwise ⊖ | ⊕ |
|          | UP   | Clockwise ⊕         | ⊖ |

SVGBE0314L



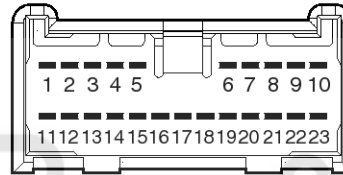
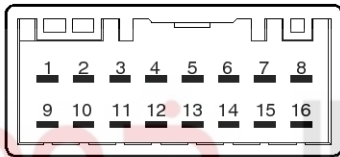
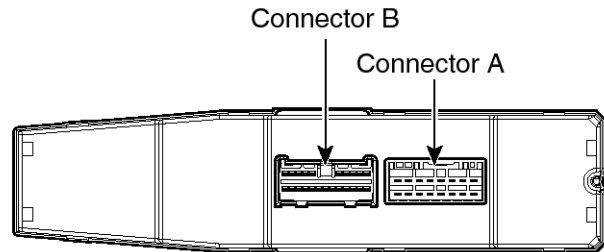
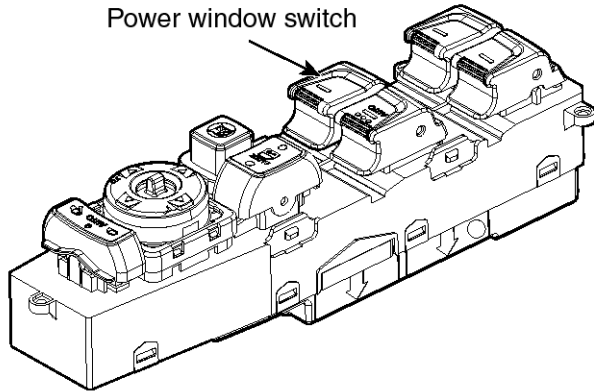
# Power Windows

# BE-369

## Power Window Switch

### Circuit Diagram

### Driver Power Window Switch (1)



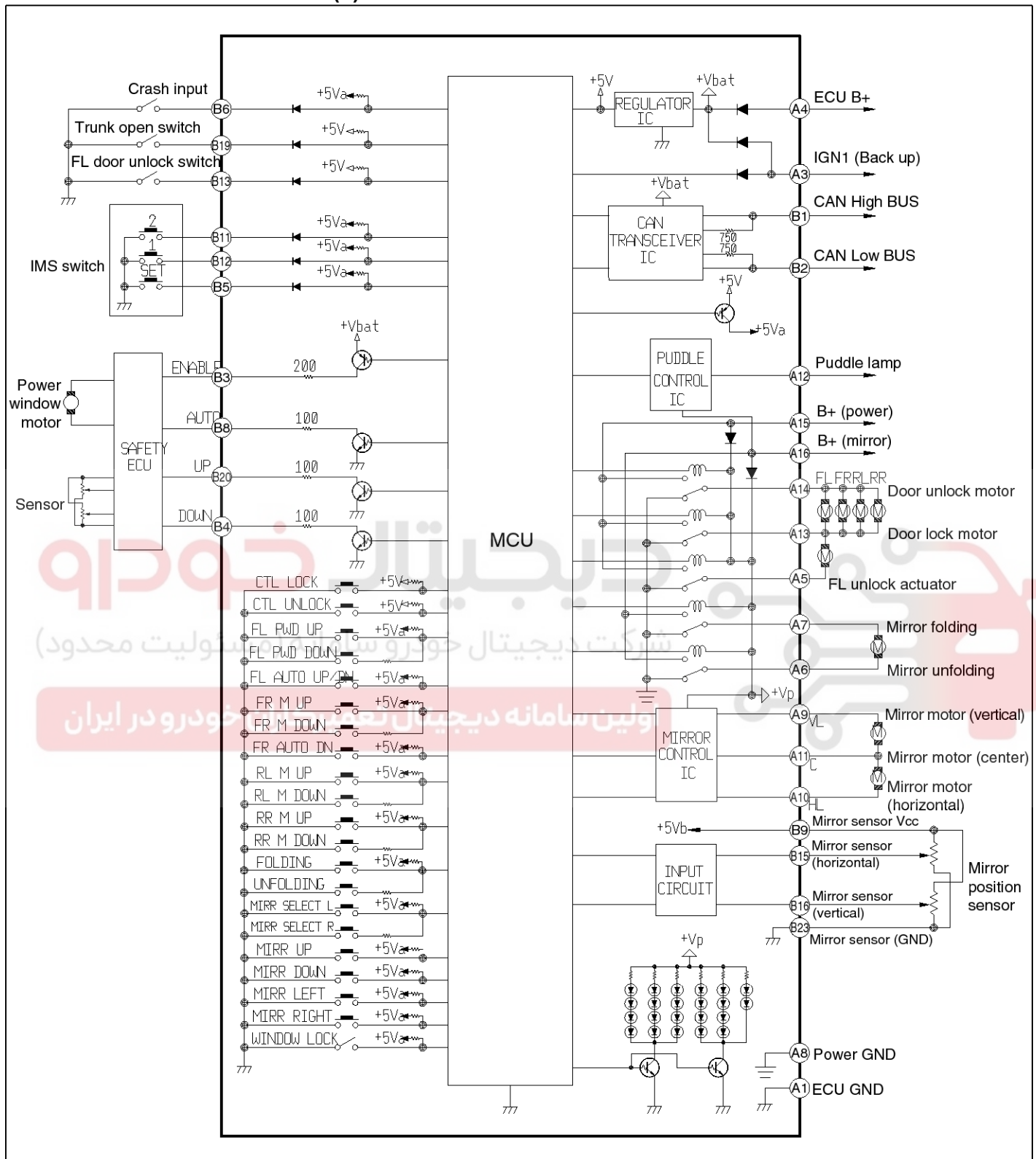
| No. | Connector A               | No. | Connector B                |
|-----|---------------------------|-----|----------------------------|
| 1   | ECU GND                   | 1   | CAN high                   |
| 2   |                           | 2   | CAN low                    |
| 3   | IGN1 (back up lamp)       | 3   | Power (Safety window)      |
| 4   | Battery (+)               | 4   | Down (Safety window)       |
| 5   |                           | 5   | SET switch (IMS)           |
| 6   | Mirror unfolding          | 6   | Crash input                |
| 7   | Mirror folding            | 7   | -                          |
| 8   | Power GND                 | 8   | Auto (Safety window)       |
| 9   | Mirror motor (vertical)   | 9   | Mirror sensor Vcc          |
| 10  | Mirror motor (horizontal) | 10  | -                          |
| 11  | Mirror motor (center)     | 11  | Switch 2 (IMS)             |
| 12  | Puddle lamp               | 12  | Switch 1 (IMS)             |
| 13  | Door lock motor           | 13  | Door unlock switch         |
| 14  | Door unlock motor         | 14  | -                          |
| 15  | Battery (+) power         | 15  | Mirror sensor (horizontal) |
| 16  | Battery (+) mirror        | 16  | Mirror sensor (vertical)   |
|     |                           | 17  | -                          |
|     |                           | 18  | -                          |
|     |                           | 19  | Trunk open switch          |
|     |                           | 20  | Up (Safety window)         |
|     |                           | 21  | -                          |
|     |                           | 22  | -                          |
|     |                           | 23  | Sensor GND                 |

SVGBE0315L

# BE-370

# Body Electrical System

## Driver Power Window Switch (2)

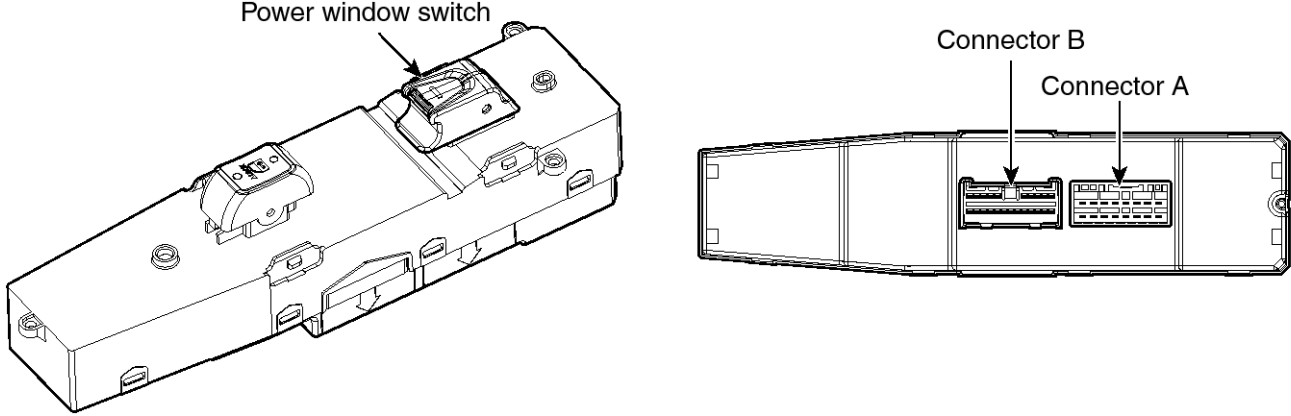


SVGBE0316L

# Power Windows

# BE-371

## Passenger Power Window Switch



The diagram shows the passenger power window switch from two perspectives. On the left, a 3D view of the physical switch unit with a label 'Power window switch' pointing to the main control area. On the right, a top-down view of the connector housing with two connectors labeled 'Connector B' and 'Connector A'.

| Connector A |                           | Connector B |                            |
|-------------|---------------------------|-------------|----------------------------|
| No.         | Connector A               | No.         | Connector B                |
| 1           | ECU GND                   | 1           | CAN high                   |
| 2           | -                         | 2           | CAN low                    |
| 3           | IGN1 (back up lamp)       | 3           | -                          |
| 4           | Battery (+)               | 4           | -                          |
| 5           | -                         | 5           | -                          |
| 6           | Mirror unfolding          | 6           | -                          |
| 7           | Mirror folding            | 7           | -                          |
| 8           | Power GND                 | 8           | -                          |
| 9           | Mirror motor (vertical)   | 9           | Mirror sensor Vcc          |
| 10          | Mirror motor (horizontal) | 10          | -                          |
| 11          | Mirror motor (center)     | 11          | -                          |
| 12          | Puddle lamp               | 12          | -                          |
| 13          | Up (Power window)         | 13          | Door unlock switch         |
| 14          | Down (Power window)       | 14          | -                          |
| 15          | Battery (+) power         | 15          | Mirror sensor (horizontal) |
| 16          | Battery (+) mirror        | 16          | Mirror sensor (vertical)   |
|             |                           | 17          | -                          |
|             |                           | 18          | -                          |
|             |                           | 19          | -                          |
|             |                           | 20          | -                          |
|             |                           | 21          | -                          |
|             |                           | 22          | -                          |
|             |                           | 23          | Sensor GND                 |

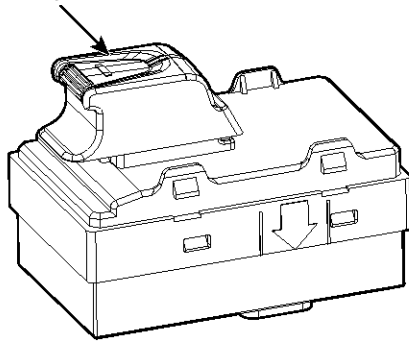
SVGBE0333L

# BE-372

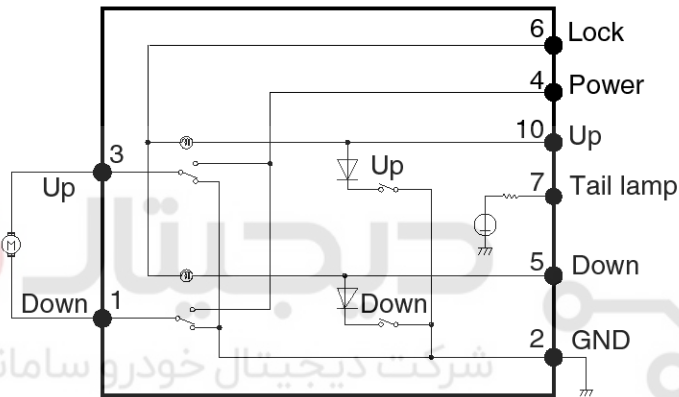
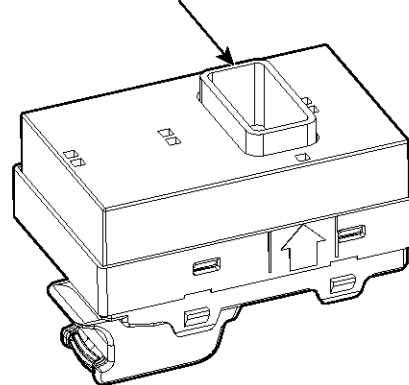
# Body Electrical System

## Rear Power Window Switch

Rear power window switch

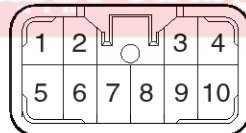


Connector A



درجیتال خودرو  
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



| No. | Connector A              |
|-----|--------------------------|
| 1   | Power window motor down  |
| 2   | GND                      |
| 3   | Power window motor up    |
| 4   | Power                    |
| 5   | Power window switch down |
| 6   | Power window switch up   |
| 7   | Tail lamp (IND)          |
| 8   | -                        |
| 9   | -                        |
| 10  | Power window switch up   |

SVGBE0334L

# Power Windows

# BE-373

## Inspection

### Driver Power Window Switch

1. When checking the driver power window switch, select a vehicle type and "IPM" menu.

2. Select "DDM (Driver Door Module)".
3. Select option "Input/Output monitoring".

Current Data □

Standard Display ▾ Full List ▾ Graph ▾ Items List ▾ Reset Min.Max. Record Stop ▾

| Sensor Name                                                             | Value | Unit |
|-------------------------------------------------------------------------|-------|------|
| <input type="checkbox"/> Drive side Outside Mirror UP Switch on/off     | OFF   | -    |
| <input type="checkbox"/> Drive side Outside Mirror DOWN Switch on/off   | OFF   | -    |
| <input type="checkbox"/> Drive side Outside Mirror Left Switch on/off   | OFF   | -    |
| <input type="checkbox"/> Drive side Outside Mirror Right Switch on/off  | OFF   | -    |
| <input type="checkbox"/> Assist side Outside Mirror UP Switch on/off    | OFF   | -    |
| <input type="checkbox"/> Assist side Outside Mirror DOWN Switch on/off  | OFF   | -    |
| <input type="checkbox"/> Assist side Outside Mirror Left Switch on/off  | OFF   | -    |
| <input type="checkbox"/> Assist side Outside Mirror Right Switch on/off | OFF   | -    |

SVGBE0399L

4. To check the input value of power window switch in force mode, select option "ACTUATION TEST".

Actuation Test ☰

| Test Items                        |  |
|-----------------------------------|--|
| Driver window auto up             |  |
| Driver window auto down           |  |
| Driver side mirror low            |  |
| Driver side mirror left           |  |
| Driver side mirror high           |  |
| Driver side mirror right          |  |
| Driver side mirror folder         |  |
| Driver side mirror unfolder       |  |
| Driver Door Lock                  |  |
| Driver Door Unlock                |  |
| DRIVE SIDE O/S MIRROR TURN SIGNAL |  |
| DRIVE SIDE COURTESY LAMP          |  |
| DRIVE SIDE PUDDLE LAMP            |  |

◆ Duration:

◆ Conditions:

◆ Result:

SVIBE9203L

# BE-374

# Body Electrical System

## Assist Power Window Switch

1. When checking the assist power window switch, select a vehicle type and "IPM" menu.
2. Select "ADM (Assist Door Module)".
3. Select option "Input/Output monitoring".

**Current Data** ☰

Standard Display ▾ Full List ▾ Graph ▾ Items List ▾ Reset Min.Max. Record Stop ▾

| Sensor Name                                                                    | Value  | Unit |
|--------------------------------------------------------------------------------|--------|------|
| <input type="checkbox"/> Assist Side Door Unlock                               | UNLOCK | -    |
| <input type="checkbox"/> Door lock switch on in PWDW Switch                    | OFF    | -    |
| <input type="checkbox"/> Door unlock switch on in PWDW Switch                  | OFF    | -    |
| <input type="checkbox"/> IGN1 Switch on/off                                    | OFF    | -    |
| <input type="checkbox"/> Assist Pwdw Up Output on                              | OFF    | -    |
| <input type="checkbox"/> Assist Pwdw Down Output on                            | OFF    | -    |
| <input type="checkbox"/> Assist Pwdw Auto Down Output on                       | OFF    | -    |
| <input type="checkbox"/> Assist side Mirror Horizontal position sensor voltage | 2260   | mV   |
| <input type="checkbox"/> Assist side Mirror Vertical position sensor voltage   | 1980   | mV   |

SVGBE0403L

4. To check the input value of power window switch in force mode, select option "ACTUATION TEST".

**Actuation Test** ☰

Test Items

|                                                      |  |
|------------------------------------------------------|--|
| Operate ASSIST SIDE WINDOW AUTO DOWN                 |  |
| Operate ASSIST SIDE WINDOW UP                        |  |
| Operate ASSIST SIDE WINDOW DOWN                      |  |
| Move ASSIST OUTSIDE MIRROR to the highest Position   |  |
| Move ASSIST OUTSIDE MIRROR to the lowest Position    |  |
| Move ASSIST OUTSIDE MIRROR to the most left Position |  |

◆ Duration:

◆ Conditions:

◆ Result:

SVGBE0404L

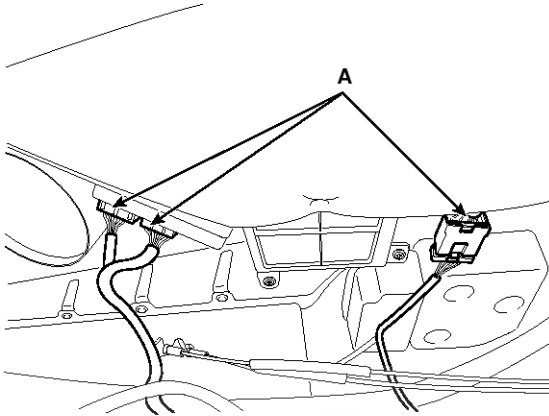
# Power Windows

# BE-375

## Removal

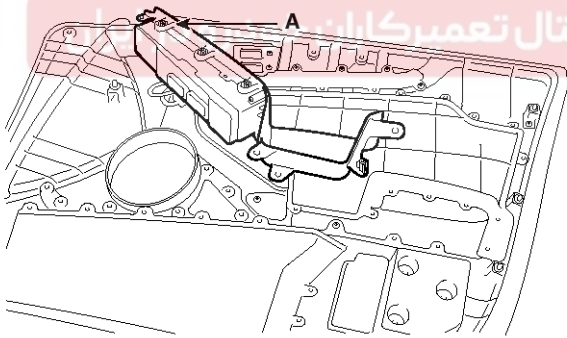
### Driver Power Window Switch

1. Disconnect the negative(-) battery terminal.
2. Remove the front door trim panel.  
(Refer to the BD group - "Front door")
3. Disconnect the power window switch module connector (A) from the wiring harness.



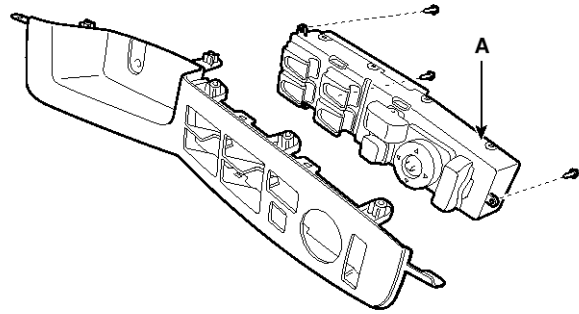
SVGB10089D

4. Remove the power window switch module (A) from the door trim after loosening the mounting screws (13EA).



SVGBE0339D

5. Remove the module (A) from the sub box assembly after loosening the mounting screw (3EA).



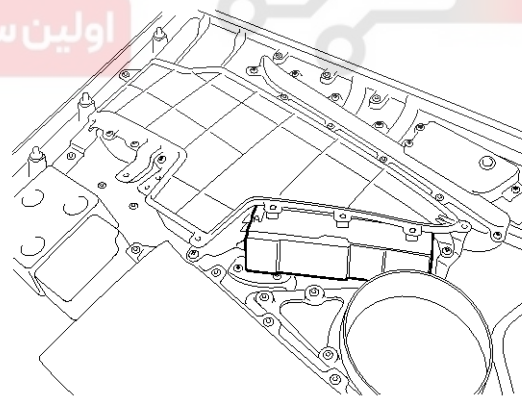
SVGBE0340D

### NOTICE

- Be careful not to damage door trim panel and door module mounting hooks.

### Passenger Power Window Switch

1. Disconnect the negative (-) battery terminal.
2. Remove the rear door trim panel. (Refer to the BD group - "Rear door")
3. Disconnect the connector from the power window switch module.

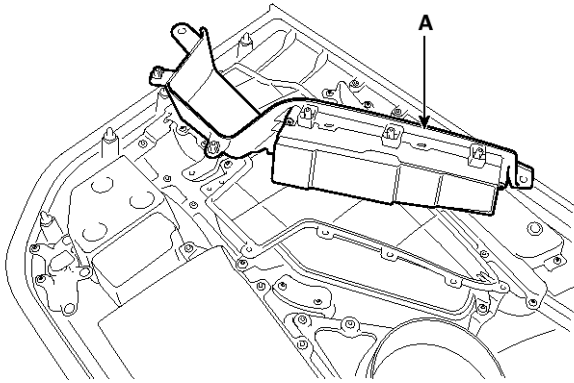


SVGBE0330D



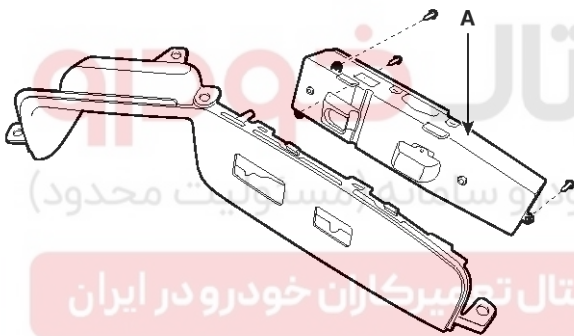
## BE-376

- Remove the power window switch module (A) from the door trim after loosening the mounting screws (13EA).



SVGBE0331D

- Remove the module (A) from the sub box assembly after loosening the mounting screw (3EA).

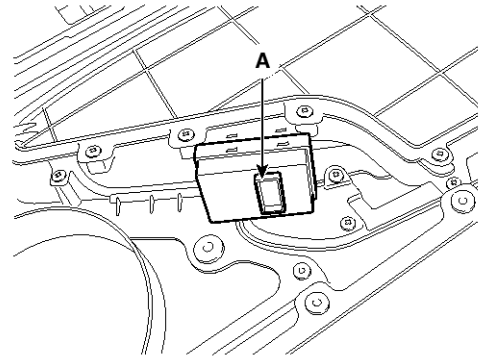


SVGBE0332D

## Body Electrical System

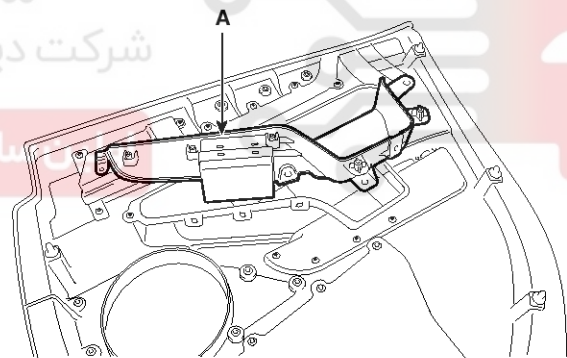
## Rear Power Window Switch

- Disconnect the negative (-) battery terminal.
- Remove the rear door trim panel. (Refer to the BD group - "Rear door")
- Disconnect the connector from the power window switch module.



SVGBE0333D

- Remove the power window switch module (A) from the door trim after loosening the mounting screws (13EA).



SVGBE0334D

- Remove the module (A) from the sub box assembly.

## Installation

- Install the power window switch module.
- Install the door trim panel after reconnecting the relevant connectors

## NOTICE

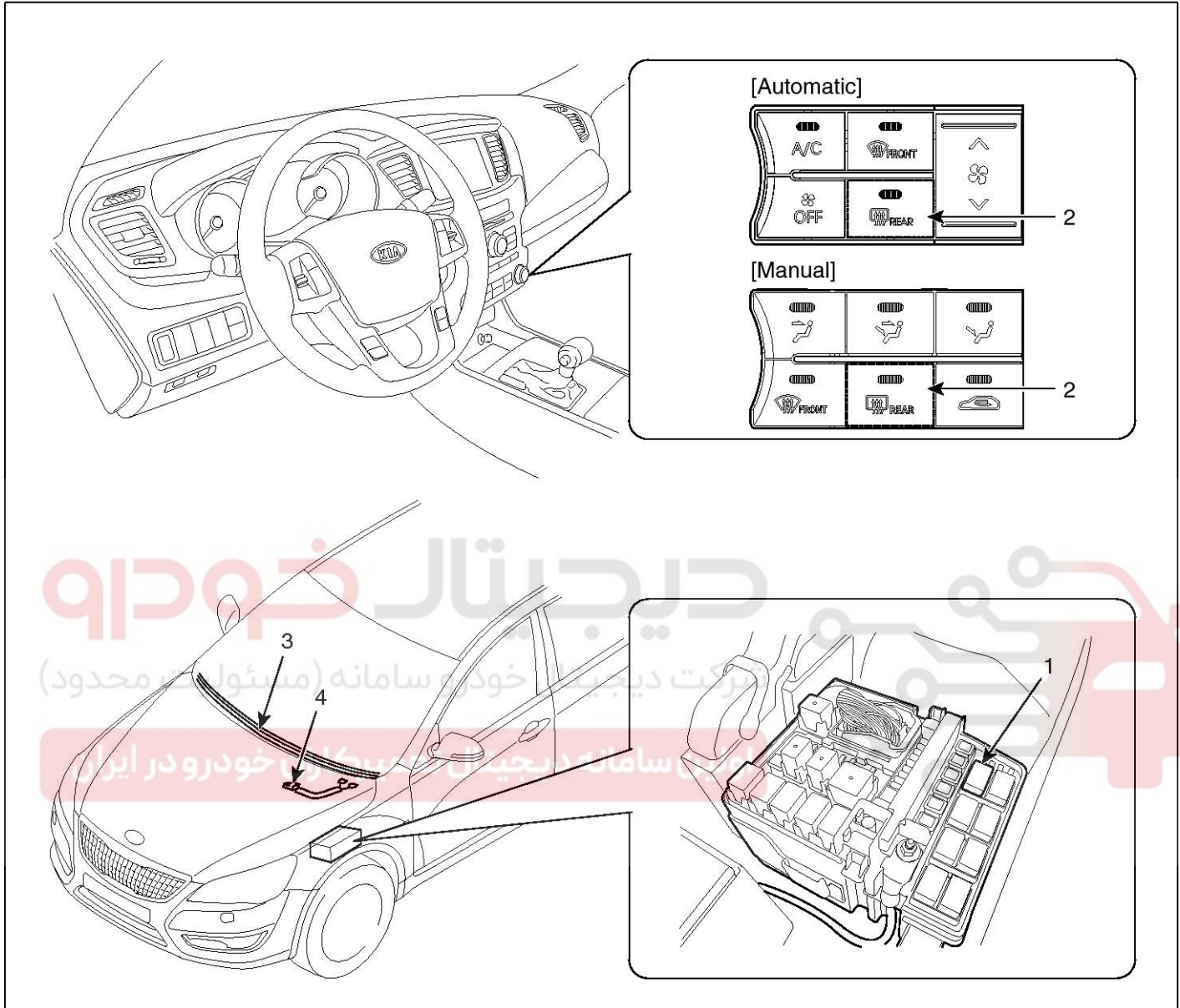
- Make sure that the power window switch module connectors are plugged properly.
- Check that the power window switch and door lock switch operate normally.

# Windshield Deicer

# BE-377

## Windshield Deicer

### Component Location



SVGBE0319L

- 1. Windshield deicer relay (Built-in engine room relay box)
- 2. Windshield deicer switch (Rear glass defogger switch)

- 3. Windshield deicer
- 4. Deicer connector

### Description

Windshield deicer system prevent windshield wiper from freezing in the winter season. It consists of deicer in the lower part of windshield, switch and relay. IPM receives an input signal from the deicer switch, then controls relay. Operating condition is the same that of rear window defogger system.

Since the generator "L" is switched ON, if the deicer switch is ON, then deicer output is ON for 20 minutes.

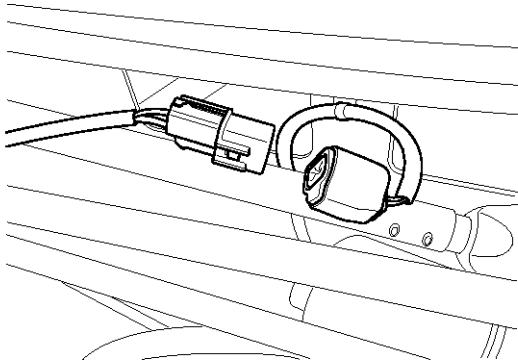
## BE-378

## Body Electrical System

## Windshield Deicer

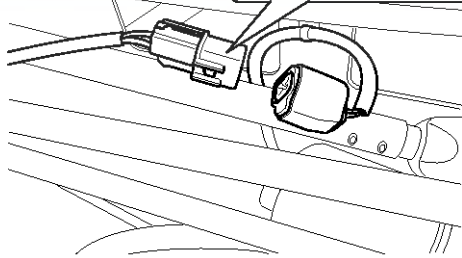
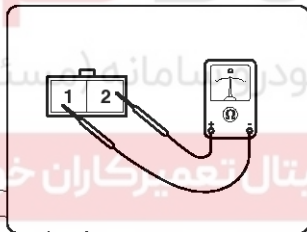
## Inspection

1. Remove the cowl top cover. (Refer to the wiper)
2. Disconnect the windshield deicer connector (A) from the wiper motor linkage.



SVGBE0314D

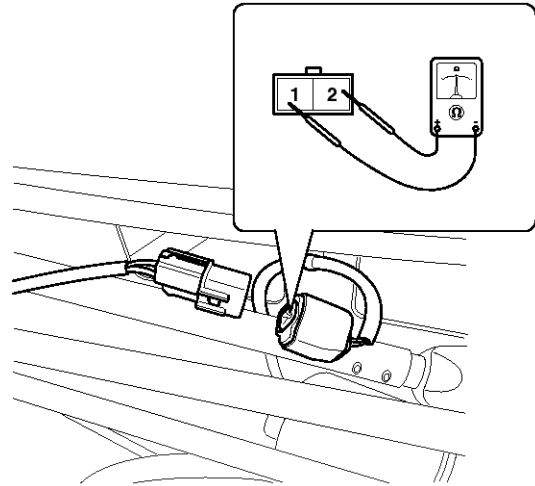
3. Check for continuity between the terminals of deicer lines.



SVGBE0315D

4. Turn the ignition switch ON and the windshield deicer switch ON, then measure the voltage between the terminals of harness side deicer connector.

**OK** : approx. Battery voltage



SVGBE0316D

# Windshield Deicer

# BE-379

## Windshield Deicer Switch

### Inspection

1. The windshield deicer switch inputs can be checked using the GDS.

2. To check the input value of windshield deicer switch, select option "IPM".
3. Select option "Current Data".

| Sensor Name                                        | Value | Unit |
|----------------------------------------------------|-------|------|
| <input type="checkbox"/> Front Fog Output          | OFF   | -    |
| <input type="checkbox"/> Rear fog relay            | OFF   | -    |
| <input type="checkbox"/> Defogger / Deicer Relay   | OFF   | -    |
| <input type="checkbox"/> Burglar horn relay        | OFF   | -    |
| <input type="checkbox"/> Horn relay                | OFF   | -    |
| <input type="checkbox"/> Trunk release relay       | OFF   | -    |
| <input type="checkbox"/> Int Volume                | 2.25  | V    |
| <input type="checkbox"/> Auto light sensor         | 1.88  | V    |
| <input type="checkbox"/> Interior Mood lamp output | OFF   | -    |

SVGBE0400L

4. To check the input value of windshield deicer switch in force mode, select option.

● Duration: Until Stop Button

● Conditions: IG. ON

● Result: Success

Start

Stop

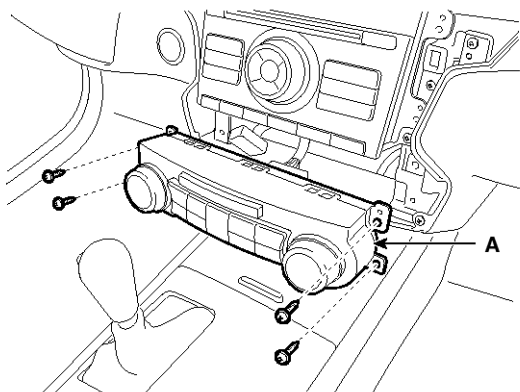
SYFBE0306L

## BE-380

## Body Electrical System

### Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the center fascia panel (Refer to BD group - "Crash pad").
3. Remove the heater control unit (A) after removing screws (4EA).



SVGB10081D

# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

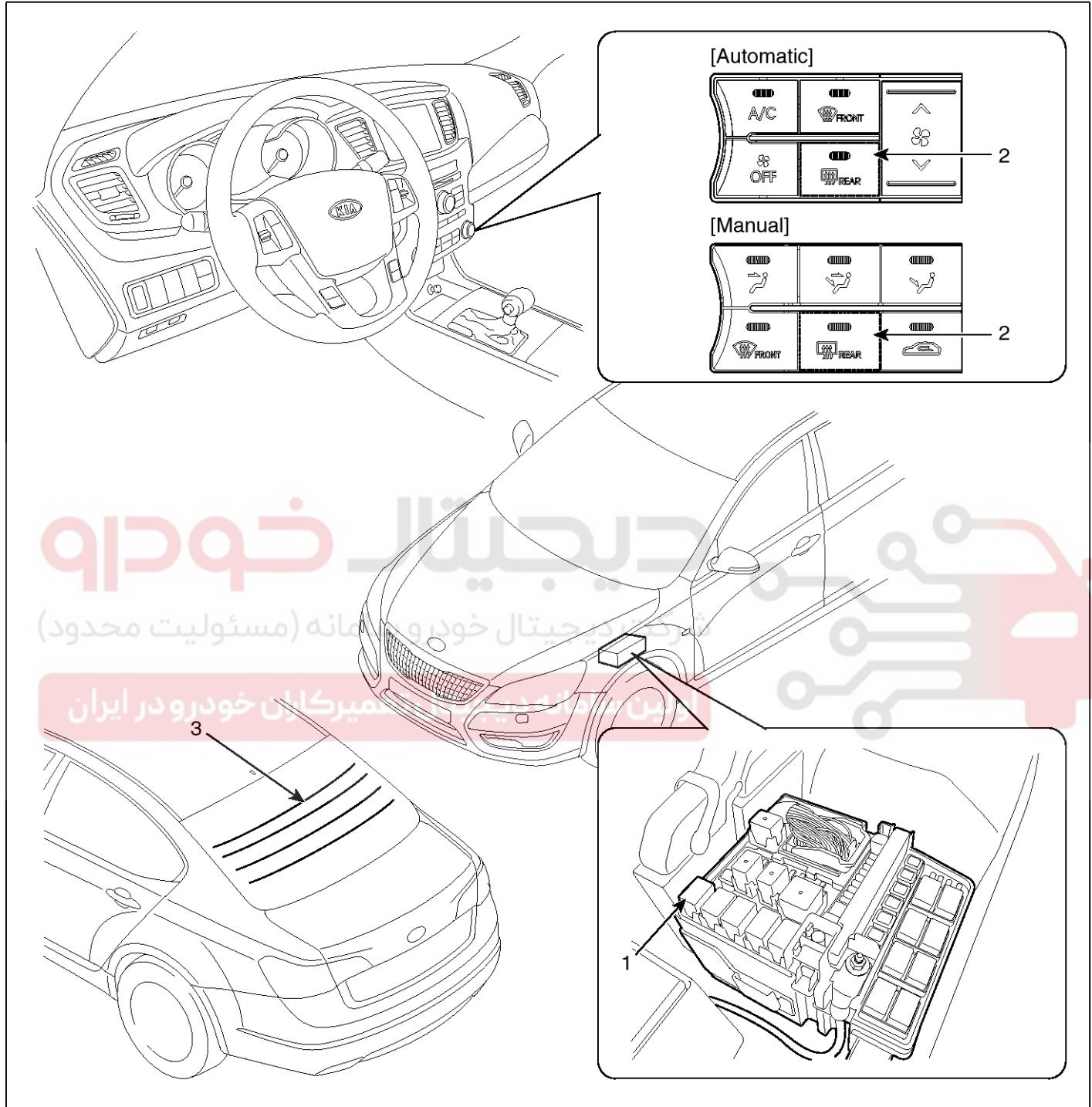


# Rear Glass Defogger

BE-381

## Rear Glass Defogger

### Component Location



SVGBE0317L

- 1. Rear glass defogger relay (Engine room relay box)
- 2. Rear glass defogger switch (A/C controller)

- 3. Rear glass defogger



# BE-382

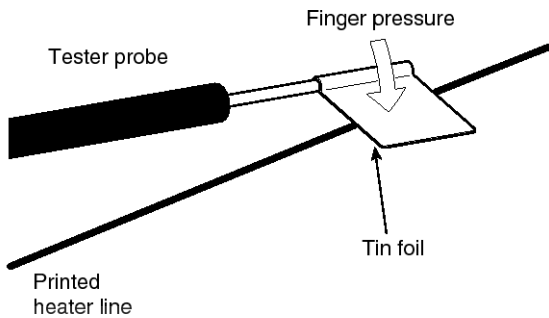
# Body Electrical System

## Rear Glass Defogger Printed Heater

### Inspection

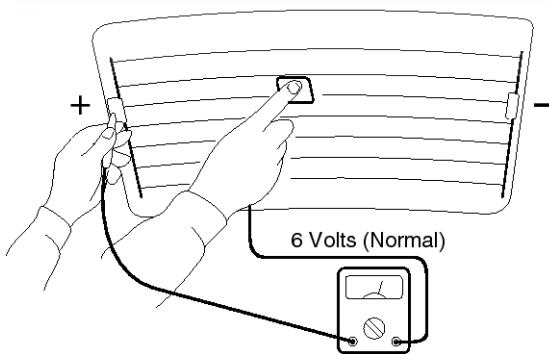
#### ⚠ CAUTION

Wrap tin foil around the end of the voltmeter test lead to prevent damaging the heater line. Apply finger pressure on the tin foil, moving the tin foil along the grid line to check for open circuits.



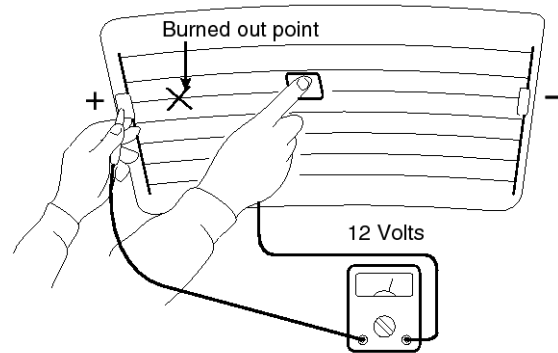
ETA9165A

1. Turn on the defogger switch and use a voltmeter to measure the voltage of each heater line at the glass center point. If a voltage of approximately 6V is indicated by the voltmeter, the heater line of the rear window is considered satisfactory.



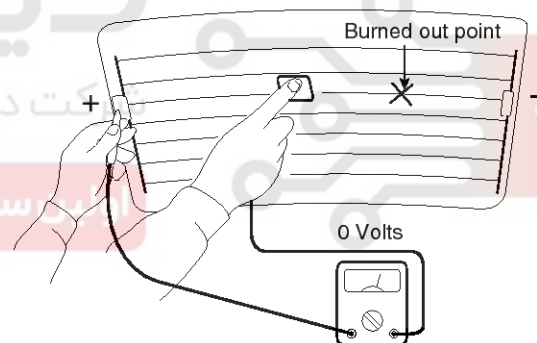
ETA9165B

2. If a heater line is burned out between the center point and (+) terminal, the voltmeter will indicate 12V.



ETA9165C

3. If a heater line is burned out between the center point and (-) terminal, the voltmeter will indicate 0V.



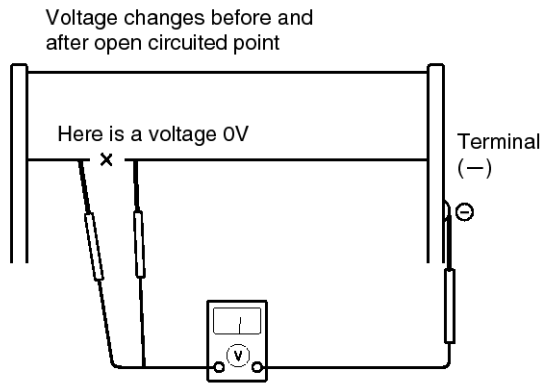
ETA9165D



# Rear Glass Defogger

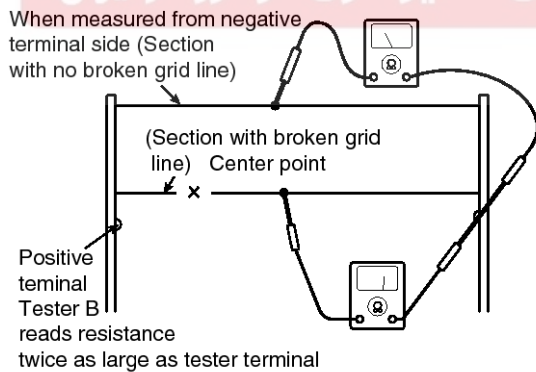
# BE-383

- To check for open circuits, slowly move the test lead in the direction that the open circuit seems to exist. Try to find a point where a voltage is generated or changes to 0V. The point where the voltage has changed is the open-circuit point.



ETA9165E

- Use an ohmmeter to measure the resistance of each heater line between a terminal and the center of a grid line, and between the same terminal and the center of one adjacent heater line. The section with a broken heater line will have a resistance twice as that in other sections. In the affected section, move the test lead to a position where the resistance sharply changes.



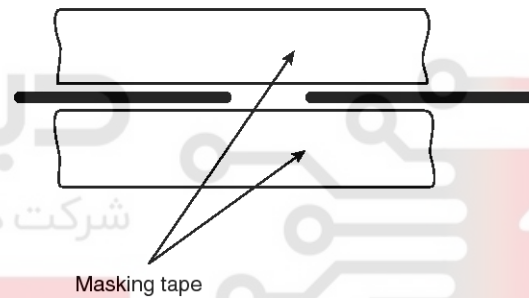
ETA9165F

## Repair Of Broken Heater Line

Prepare the following items:

- Conductive paint.
- Paint thinner.
- Masking tape.
- Silicone remover.
- Using a thin brush:

Wipe the glass adjacent to the broken heater line, clean with silicone remover and attach the masking tape as shown. Shake the conductive paint container well, and apply three coats with a brush at intervals of about 15 minutes apart. Remove the tape and allow sufficient time for drying before applying power. For a better finish, scrape away excess deposits with a knife after the paint has completely dried. (Allow 24 hours).



ETA9165G

# BE-384

# Body Electrical System

## Rear Glass Defogger Switch

### Inspection

1. The rear glass defogger switch inputs can be checked using the GDS.
2. To check the input value of rear glass defogger switch, select option "IPM".

3. To consult the present input/output value of IPM, "Current DATA". It provides information of IPM input/output conditions of rear defogger relay.

**Current Data**

Standard Display | Full List | Graph | Items List | Reset Min.Max. | Record | Stop

| Sensor Name                                        | Value | Unit |
|----------------------------------------------------|-------|------|
| <input type="checkbox"/> Front Fog Output          | OFF   | -    |
| <input type="checkbox"/> Rear fog relay            | OFF   | -    |
| <input type="checkbox"/> Defogger / Deicer Relay   | OFF   | -    |
| <input type="checkbox"/> Burglar horn relay        | OFF   | -    |
| <input type="checkbox"/> Horn relay                | OFF   | -    |
| <input type="checkbox"/> Trunk release relay       | OFF   | -    |
| <input type="checkbox"/> Int Volume                | 2.25  | V    |
| <input type="checkbox"/> Auto light sensor         | 1.88  | V    |
| <input type="checkbox"/> Interior Mood lamp output | OFF   | -    |

SVGBE0400L

4. To check the input value of rear glass defogger switch in force mode, select option "Actuation Test".

**Actuation Test**

Test Items

- Head Lamp Low Relay
- Head Lamp High Relay
- Front Fog Lamp
- Tail Lamp Relay
- AV Tail
- Burglar horn relay
- Tailgate/Trunk Release Relay
- Starter inhibit relay
- Rear defogger relay
- Front deicer relay
- Central Door Lock Relay
- Central Door Unlock Relay
- Driver Door Unlock Relay
- Power window relay
- Turn Left Signal
- Turn Right Signal

● Duration: Until Stop Button  
 ● Conditions: IG. ON  
 ● Result: Success

Start | Stop

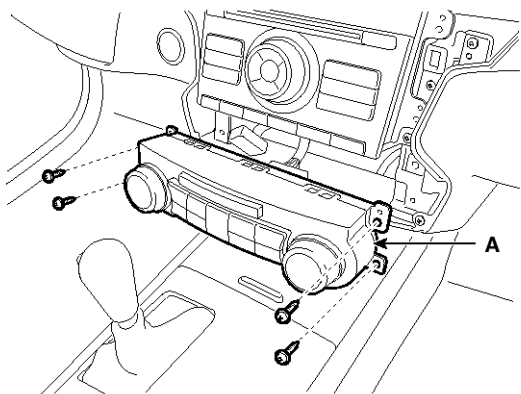
SYFBE0306L

## Rear Glass Defogger

**BE-385**

### Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the center fascia panel (Refer to BD group - "Crash pad").
3. Remove the heater control unit (A) after removing screws (4EA).



SVGB10081D

# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

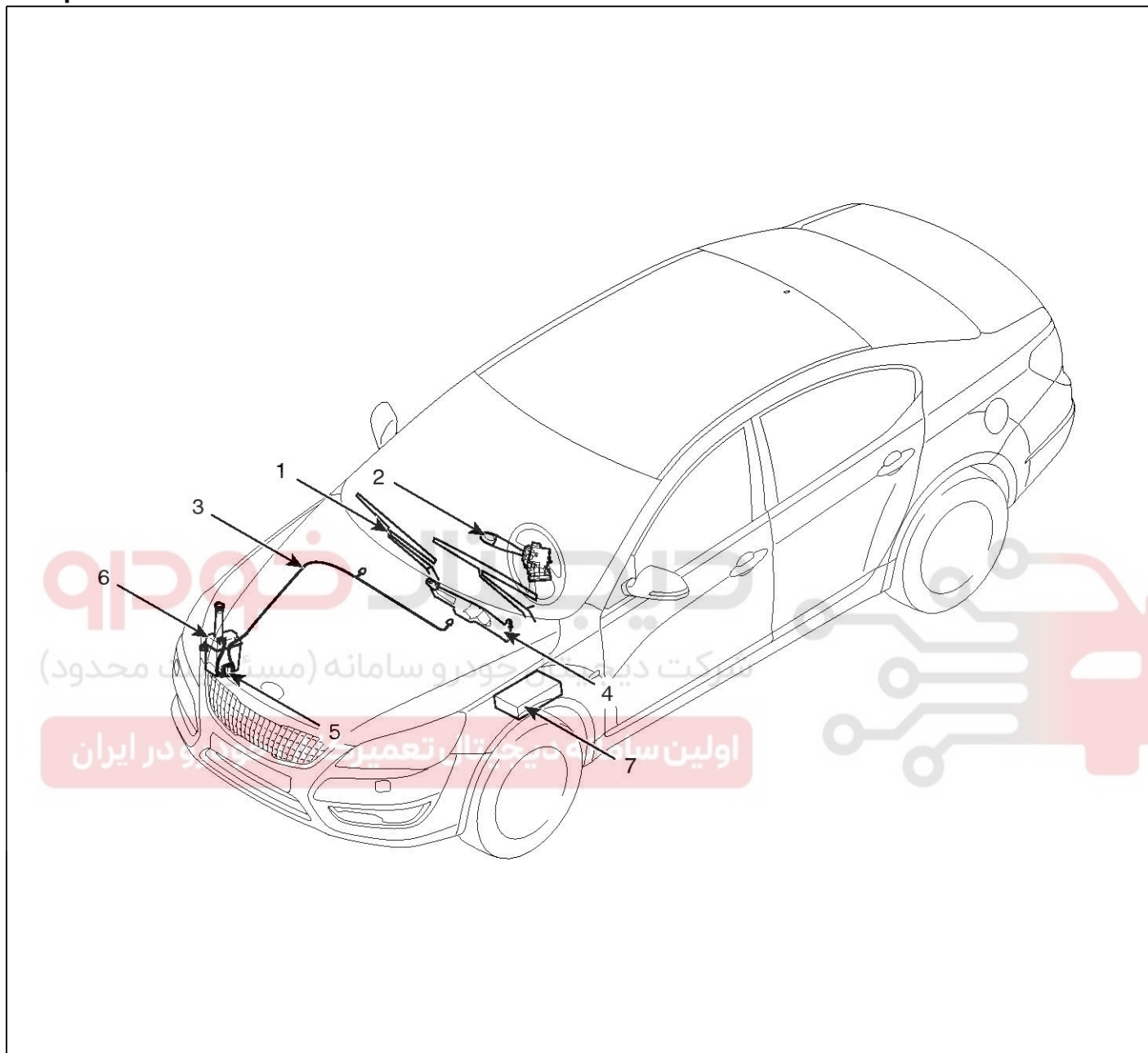


## BE-386

## Body Electrical System

## Windshield Wiper/Washer

## Component Location



SVGBE0291D

- |                                     |                                        |
|-------------------------------------|----------------------------------------|
| 1. Windshield wiper arm & blade     | 5. Washer motor                        |
| 2. Wiper & washer switch            | 6. Washer reservoir                    |
| 3. Windshield washer hose           | 7. Wiper relay (Engine room relay box) |
| 4. Windshield wiper motor & linkage |                                        |

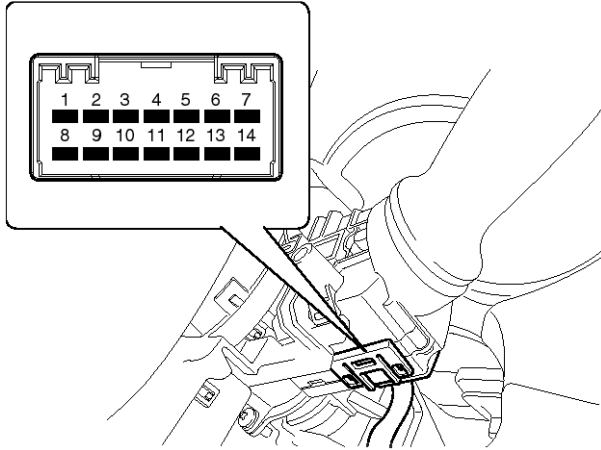
# Windshield Wiper/Washer

# BE-387

## Windshield Wiper-Washer Switch

### Inspection

Check for continuity between the terminals while operating the wiper and washer switch. If it is not normal condition, replace wiper and wiper switch.



SVGB10079D

### Wiper Switch

| Terminal<br>Position | 3 | 9 | 2 | 8 | 10 | 1 | 4 | 5 |
|----------------------|---|---|---|---|----|---|---|---|
| MIST                 | ○ | — | ○ |   |    | ○ | ○ |   |
| OFF                  | ○ | — | ○ |   |    |   |   |   |
| INT                  | ○ | — | ○ | ○ | ○  |   | ○ | ○ |
| LOW                  | ○ | — | ○ | ○ | ○  |   |   |   |
| HI                   |   | ○ | — | ○ | ○  |   |   |   |

SVGBE0320L

### Washer Switch

| Terminal<br>Position | 10 | 11 |
|----------------------|----|----|
| OFF                  |    |    |
| ON                   | ○  | ○  |

SVGBE0321L

دیجیتال خودرو  
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

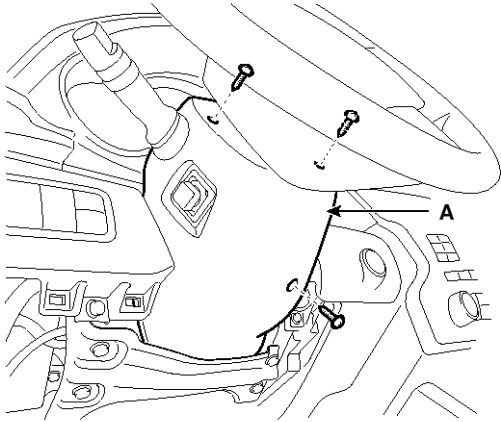
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

## BE-388

## Body Electrical System

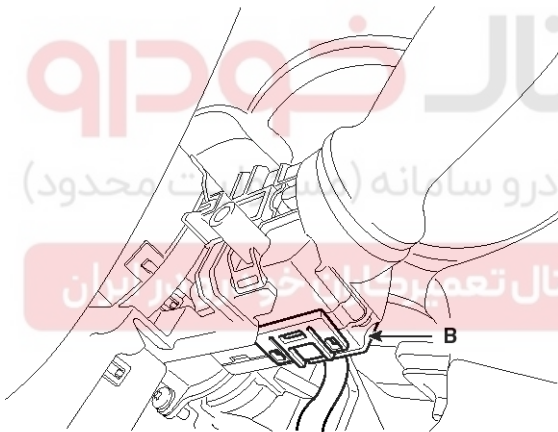
## Removal

1. Remove the steering column upper and lower shrouds after removing 3 screws.



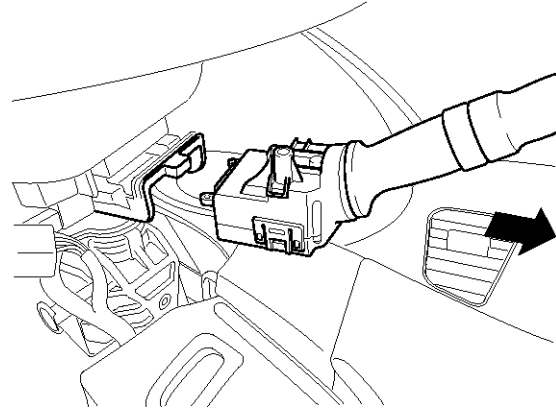
SVGBE0041D

2. Remove the wiper switch connector (A) by releasing the part.

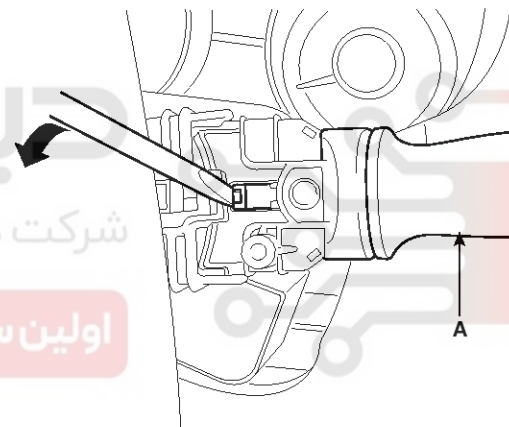


SVGB10076D

3. If necessary of removing the wiper & washer switch (A) only, release the lock of wiper switch using tool without removing the steering wheel and the clock spring.



SVGBE0043D



SVGB10077D

## Installation

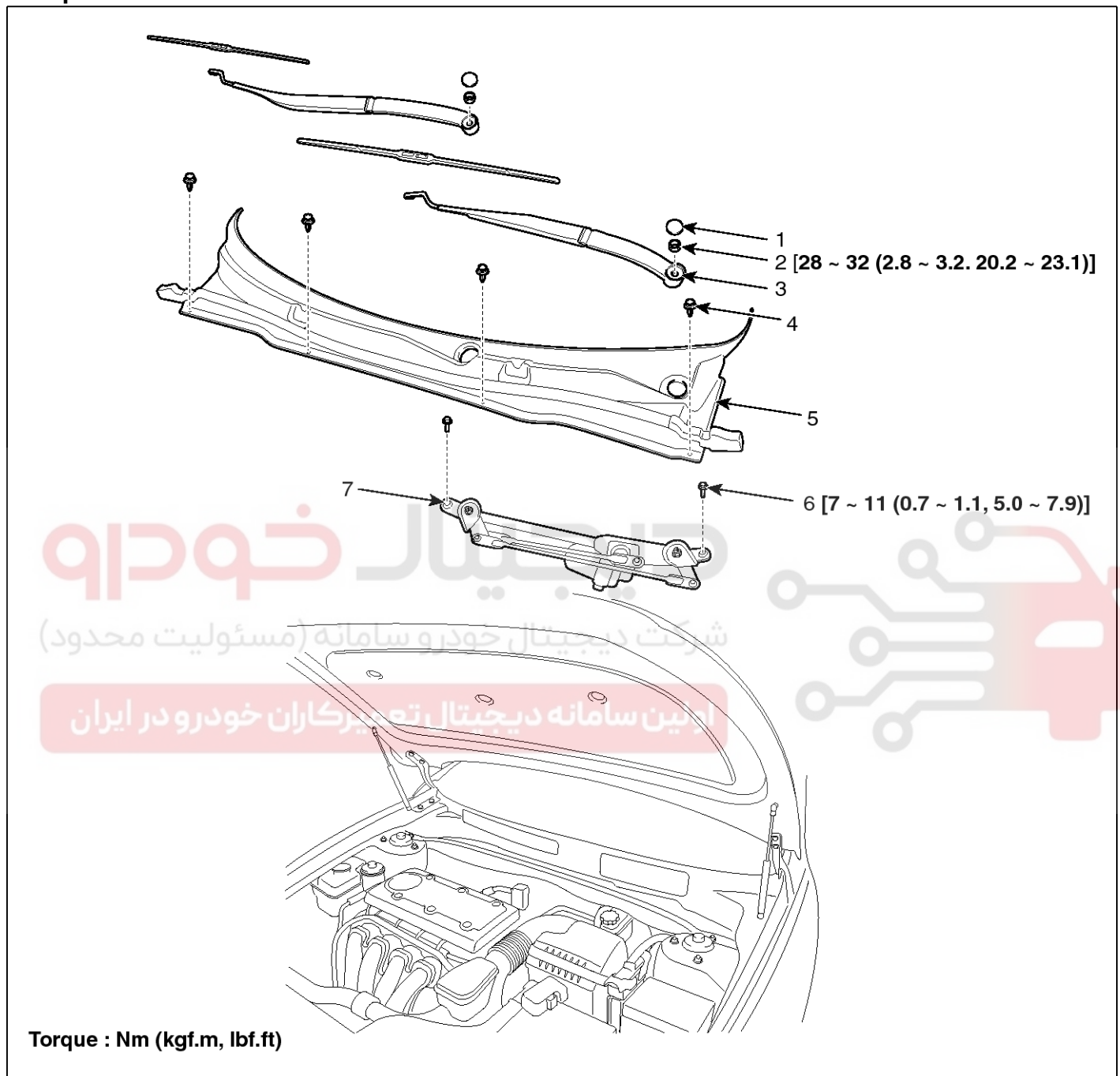
1. Install the wiper switch.
2. Install the steering column upper and lower shrouds.

# Windshield Wiper/Washer

BE-389

## Front Wiper Motor

### Component Location



SVGBE0323L

- 1. Cap
- 2. Nut
- 3. Wiper arm & blade
- 4. Rivet

- 5. Cowl top cover
- 6. Bolt
- 7. Wiper motor & linkage assembly

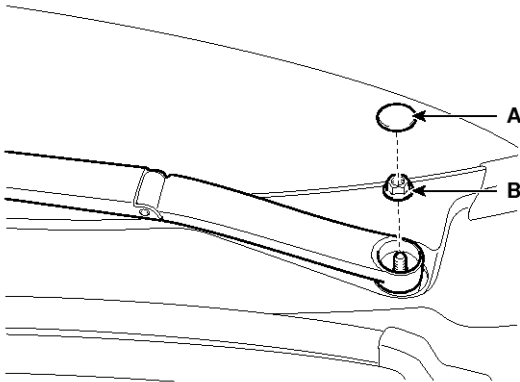


# BE-390

# Body Electrical System

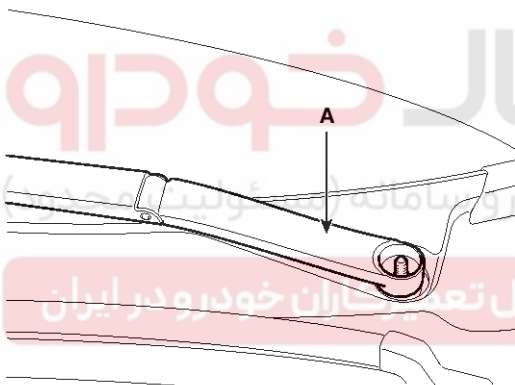
## Removal

1. Loosen the windshield wiper arm nut (B) after removing a wiper cap (A).



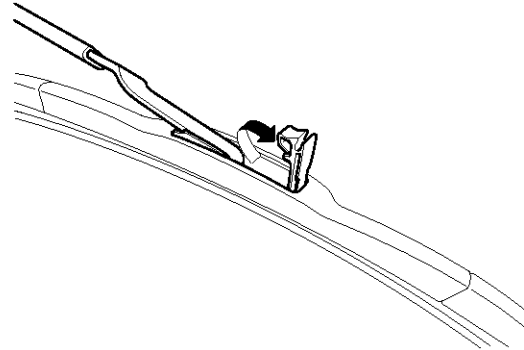
SVGBE0293D

2. Remove the windshield wiper arm and blade (A).



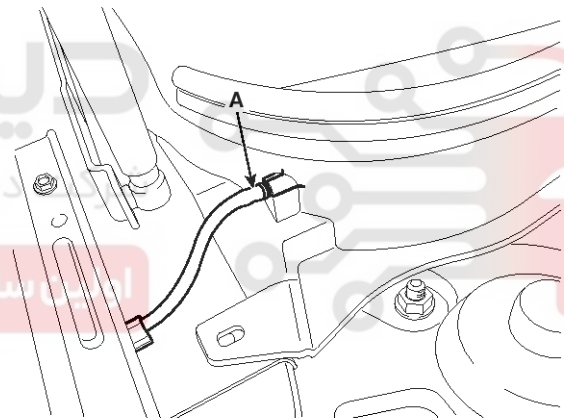
SVGBE0294D

3. If necessary, release the wiper blade fixing clip by pulling up and remove the wiper blade from the inside radius of wiper arm.



SVGBE0295D

4. Disconnect the washer hose (A) connected to cowl top cover.

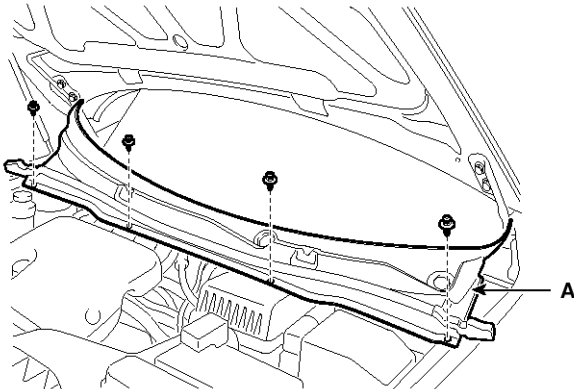


SYFBE0271D

# Windshield Wiper/Washer

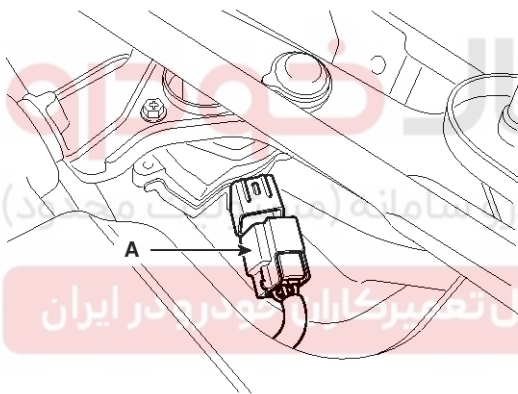
## BE-391

5. Remove the weather strip and the cowl top cover (A) after removing rivets.



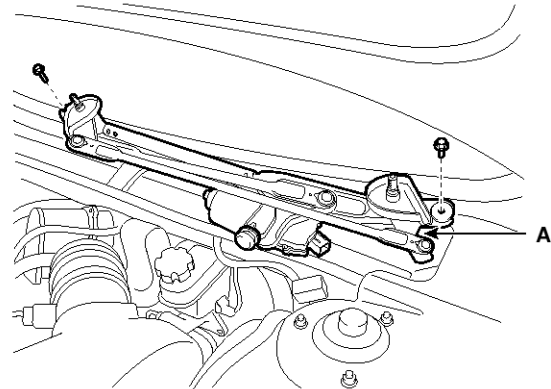
SVGBE0296D

6. Disconnect the wiper motor connector (A) from the wiper motor & linkage assembly.



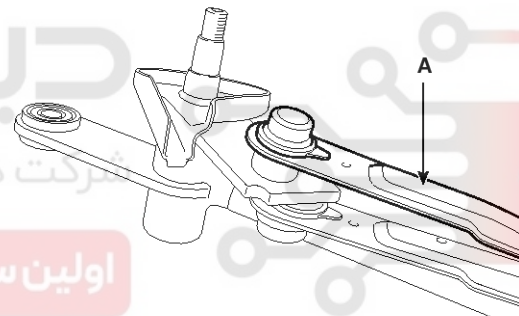
SVGBE0297D

7. Remove the windshield wiper motor and linkage assembly (A) after removing 2 bolts.



SVGBE0298D

8. Hold the wiper motor crank arm and remove the upper linkage (A) from the wiper motor crank arm.



SVGBE0299D

### ⚠ CAUTION

Before removing the wiper motor and linkage assembly, make sure that the linkage is stopped at auto stop position.

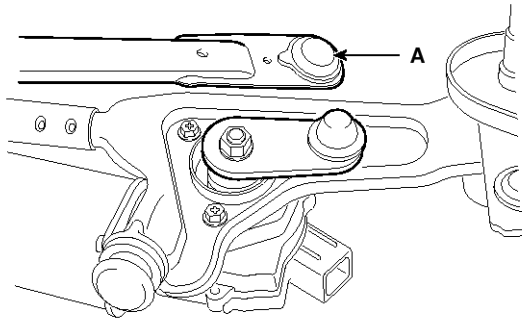
To install the wiper motor crank arm exactly, check that the linkage is aligned with the crank arm in straight line and the angle of each linkages.

Be careful not to bend the linkage.

# BE-392

# Body Electrical System

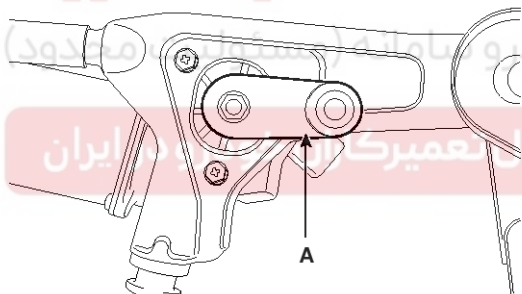
9. Remove the lower linkage (A) from the wiper motor crank arm.



SVGBE0301D

**CAUTION**

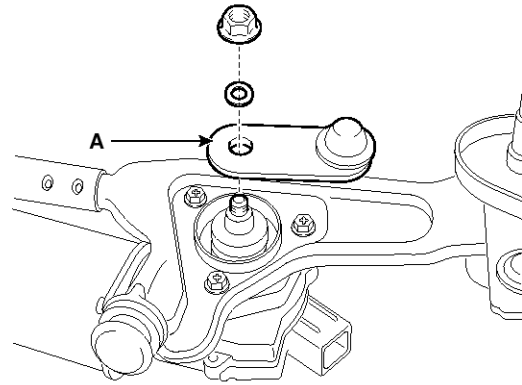
To install the wiper motor crank arm (A) exactly, check that the linkage is aligned with the crank arm in straight line and the angle of each linkages.



SVGBE0302D

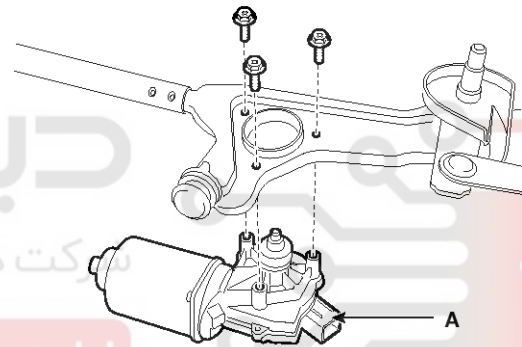
Be careful not to bend the linkage.

10. Remove the crank arm (A) after loosening a nut.



SVGBE0303D

11. Remove the wiper motor (A) after loosening the bolts.



SVGBE0304D

# Windshield Wiper/Washer

## BE-393

### Installation

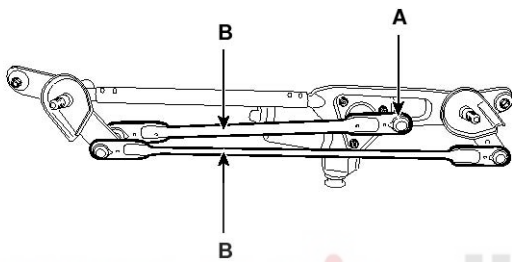
1. Install the wiper motor.
2. Install the crank arm.

#### Torque :

12.7-17.6Nm (1.3-1.8, kgf.m, 9.4-13.0 lbf.ft)

#### ⚠ CAUTION

To install the wiper motor crank arm, make sure that the linkage (B) is aligned with the crank arm (A) in straight line and set the angle of each linkages exactly.



SVGBE0305D

3. Install the lower and upper linkage to the wiper motor crank arm.
4. Install the wiper motor and linkage assembly and then connect the wiper motor connector.

#### Torque :

7-11Nm (0.7-1.1, kgf.m, 5.0-7.9 lbf.ft)

5. Install the cowl top cover.

6. Install the windshield wiper arm and blade.

#### Torque :

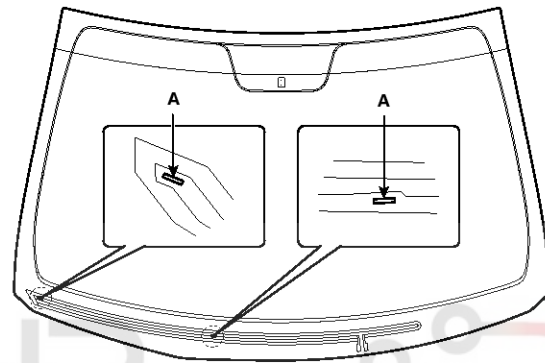
28 ~ 32 Nm (2.8 ~ 2.7 kgf.m, 20.2 ~ 23.1 lbf.ft)

#### 📌 NOTICE

- The windshield wiper motor must be cycled to make sure that it is in the auto stop position. If necessary, adjust the wiper arm and blade.

7. Install the wiper arm and blade to the specified position.

A : Auto stop position (Blade)



SVGBE0306D

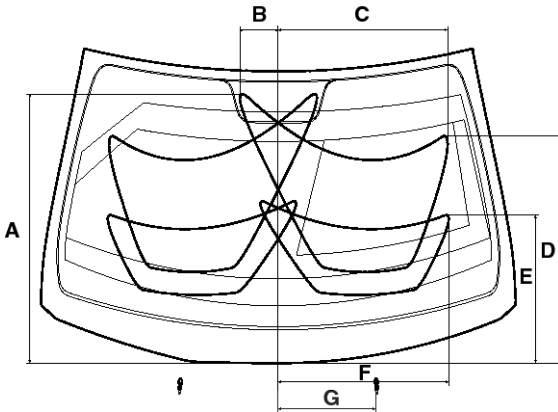
# BE-394

# Body Electrical System

8. Set the cowl top cover on the specified spray position.

**NOTICE**

- When you turn on the washer, confirm 50% or more of washer fluid lands within the spray area.
- If the spray area is not within the standard positions, adjust the nozzle(s).



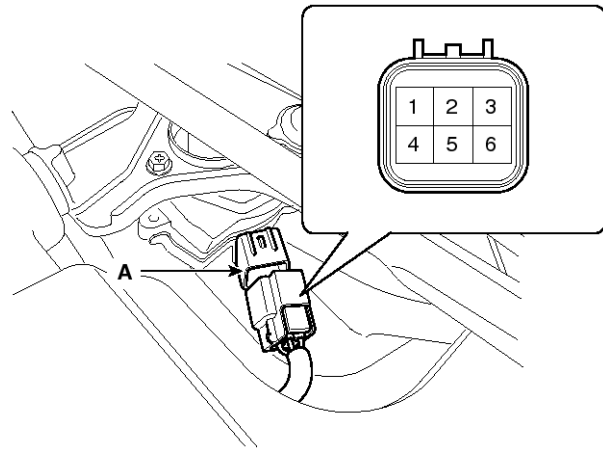
SVGBE0335L

| Specified position | Distance (in) | Distance (mm) |
|--------------------|---------------|---------------|
| A                  | 33.1          | 842           |
| B                  | 4.7           | 120           |
| C                  | 20.9          | 531           |
| D                  | 27.9          | 710           |
| E                  | 18.2          | 463           |
| F                  | 21.0          | 534           |
| G                  | 12.0          | 306           |

## Inspection

### Speed Operation Check

1. Remove the connector (A) from the wiper motor.



SVGBE0308D

| No. | Description | No. | Description |
|-----|-------------|-----|-------------|
| 1   | -           | 4   | High        |
| 2   | Battery (+) | 5   | GND         |
| 3   | Gear P      | 6   | Low         |

2. Attach the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 5.
3. Check that the motor operates at low or high speed as below table.

| Terminal Position | 3 | 2 | 4 | 6 |
|-------------------|---|---|---|---|
| OFF               | ○ | — | — | ○ |
| LOW               |   | ○ | — | ○ |
| HIGH              |   | ○ | — | ○ |

SVGBE0324L

**CAUTION**

Common sources of contamination are insects, tree sap, and hot wax treatments used by some commercial car washes. If the blades are not wiping properly, clean both the window and the blades with a good cleaner or mild detergent, and rinse thoroughly with clean water.

# Windshield Wiper/Washer

# BE-395

## Front Washer Motor

### Inspection

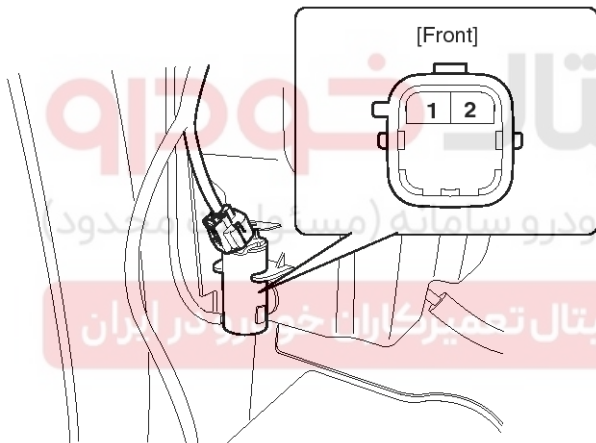
1. With the washer motor connected to the reservoir tank, fill the reservoir tank with water.

#### NOTICE

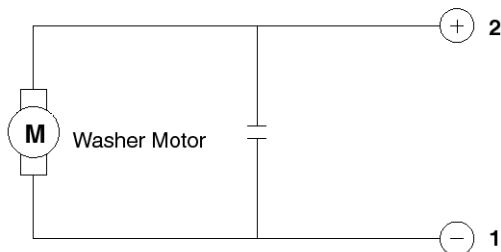
Before filling the reservoir tank with water, check the filter for foreign material or contamination. if necessary, clean the filter.

2. Connect positive (+) battery cables to terminal 1 and negative (-) battery cables to terminal 2 respectively.
3. Check that the motor operates normally and the washer motor runs and water sprays from the front nozzles.
4. If they are abnormal, replace the washer motor.

| No. | Description           | No. | Description |
|-----|-----------------------|-----|-------------|
| 1   | Windshield washer (+) | 2   | Ground      |



SVGBE0336L

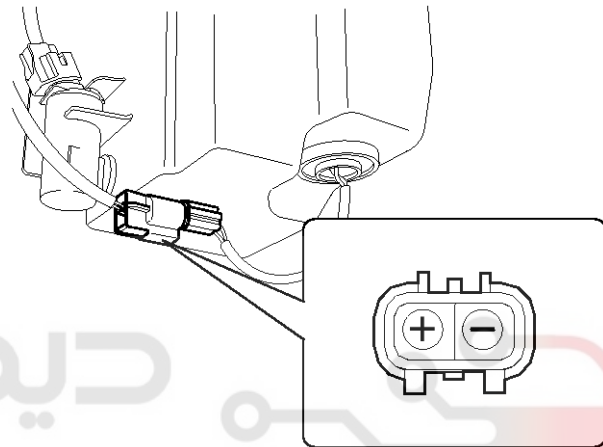


<Front Washer Motor>

SVGBE0325L

### Washer Fluid Level Sensor Switch

1. Disconnect the negative(-) battery terminal.
2. Drain the washer fluid less than 650 cc.
3. Check for continuity between the No. 1 and No.2 terminal in each float position.  
There should be continuity when the float is down.  
There should be no continuity when the float is up.
4. If the continuity is not as specified, replace the washer fluid level switch.



SVGBE0326L

| Terminal Position | 1 | 2 |
|-------------------|---|---|
| Over 650cc        |   |   |
| Under 650cc       | ○ | ○ |

(Tolerance : -50cc ~ +100cc)

SVGBE0327L

## BE-396

## Body Electrical System

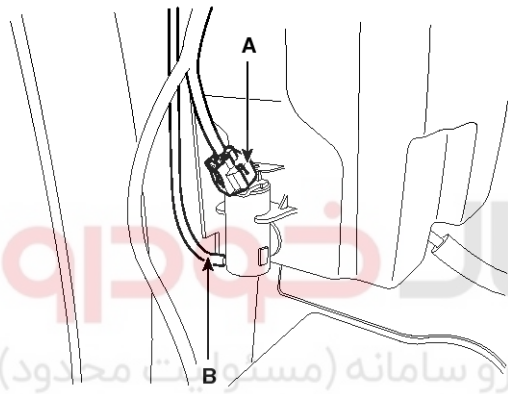
## Removal

**CAUTION**

- When servicing the washer pump, be careful not to damage the washer pump seal.
- Do not operate the washer pump before filling the washer reservoir.

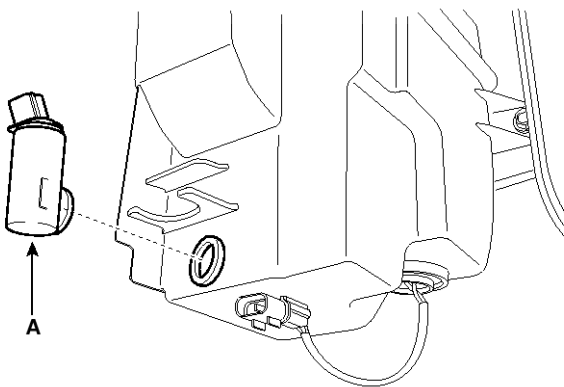
Failure to do so could result in premature pump failure.

1. Disconnect the negative (-) battery terminal.
2. Remove the front bumper.  
(Refer to the BD group - "Front bumper")
3. Remove the washer hose (B) and disconnect the washer motor connector (A).



SVGBE0310D

4. Remove the washer motor (A).

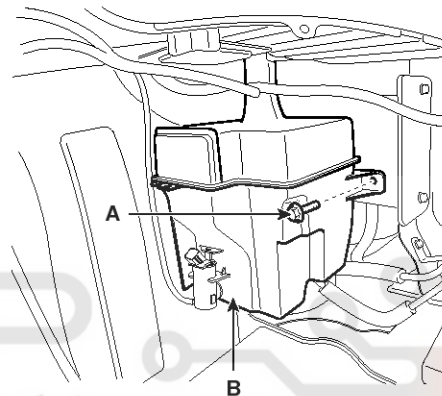
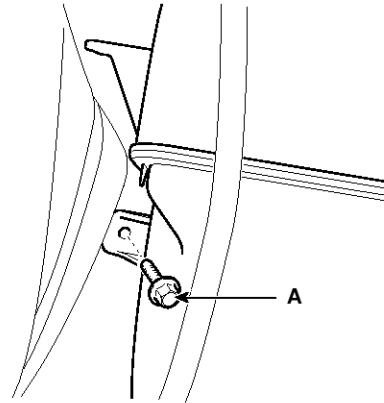


SYFBE0281D

**NOTICE**

- Washer fluid may flow out of the opening of reservoir.

5. Remove the washer reservoir (B) after removing 2 bolts (A).



SVGBE0311D

## Installation

1. Install the washer reservoir.

**NOTICE**

Before installing the pump motor, check the filter for foreign material or contamination. If necessary, clean the filter into the pump motor.

2. Install the washer motor.
3. Install the washer hose.
4. Connect the washer motor connector and level sensor connector.
5. Install the front bumper.
6. Check the washer motor operation.

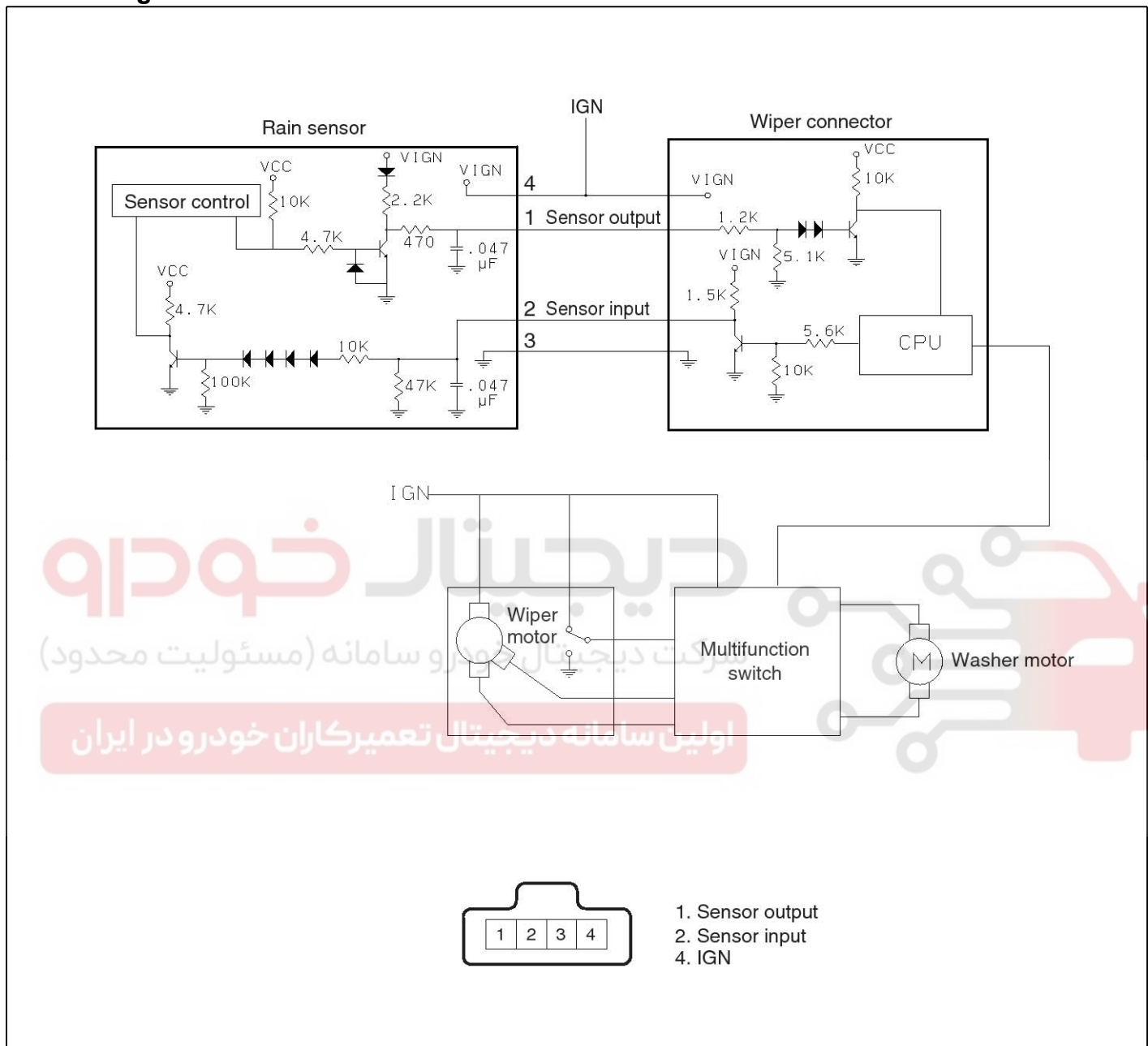


# Windshield Wiper/Washer

# BE-397

## Rain Sensor

### Circuit Diagram



SVGBE0328L

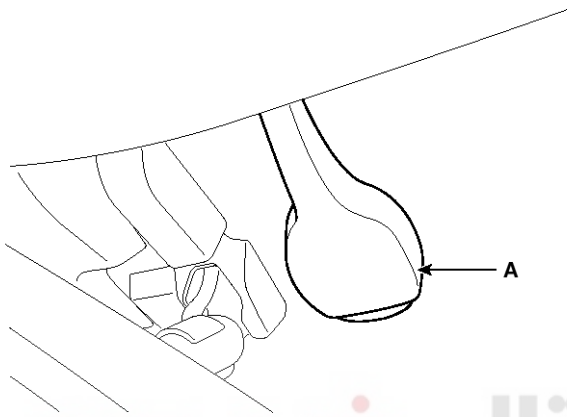
## BE-398

## Body Electrical System

### Description

The Rain sensing windshield wiper system is a wiper system that, in addition to providing normal wiper functions off, mist, manual low speed, manual high speed, and wash, provides automatic control of automatic intermittent automatic low, and automatic high speeds.

When the ignition key is in the ON position, the rain sensor will be activated.



SVGBE0312D

### System Function

#### Basic Principle

Emitted Beam from luminosity diode is reflected entirely against the windshield exterior, and then turn into photo diode.

If there is water on the windshield exterior, beam separates optically, and the degree of remained beam is measured in the photo diode.

What there is water in the windshield, it means beam is not reflected all, so the degree of lost beam indicates the degree of glass surface wet.

#### NOTICE

*Rainsensor consist of two luminosity diode, two photo diode, optic fiber and coupling pad.*

#### Operation Control

Wiper ECU transmits the signal as a rainsensor, and then the rainsensor perceives the rainwater to transmit to the wiping order wiper ECU, wiper ECU controls the wiper motor according to the signal.

#### Contact Influence

The rainsensor can malfunction due to following condition

- Contamination of the measurement surface.
- Air bubbles between the windshield and the coupling pad contact surface.
- The movement of coupling pad by vibration.
- Damaged wiper blade.

#### Operation Condition

In case that engine starts under wiper switch AUTO, rainsensor activates after once wiper operation to inform the driver that the system is under AUTO.

#### NOTICE

*In case that the rainsensor doesn't work or malfunction, it is needed manual wiper switch operation by the driver.*

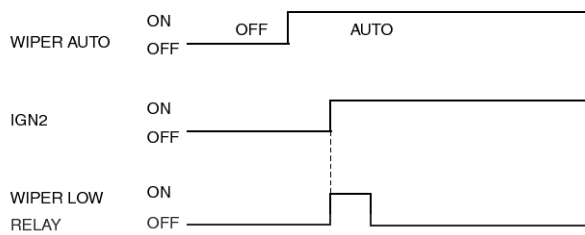
# Windshield Wiper/Washer

## BE-399

### Inspection

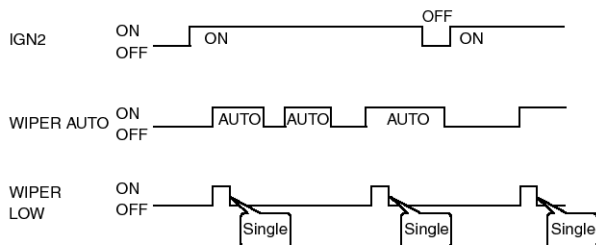
#### Rain Sensing Wiper

1. In IGN2 ON state, if auto switch input (LIN communication) is ON then both wiper low relay and wiper high relay outputs are controlled by the rain sensor input signal.
2. If the wiper switch has been left in automatic mode with the vehicle ignition OFF, and then the vehicle ignition switch is turned on, a single wipe will be performed.



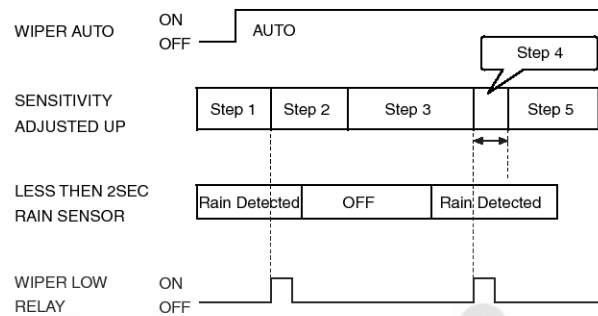
ETBF145E

3. A single wipe will be performed whenever rain has been detected (Rain Detected signal from Rain sensor) and the wiper switch is moved to the AUTO position. But a single wipe will not be performed when the wiper switch is moved to the AUTO position and OFF signal is being received from Rain sensor. But if the wiper switch is moved to AUTO position for the first time since vehicle ignition switch is turned on then a single wipe will be performed regardless of Rain Detected or OFF signal.



ETBF145F

4. The driver may adjust the rain sensor performance by adjusting the sensitivity input. When in automatic mode, the BCM will perform a single wipe each time the sensitivity is adjusted upward to a more sensitive setting (downward more than one step). This single wipe will only be performed if Rain Detected signal is being received from the Rain sensor. If the sensitivity adjustment is adjusted upward more than one sensitivity, the BCM will only perform a single wipe unless the time between increases is more than 2 seconds.



ETBF145G

# BE-400

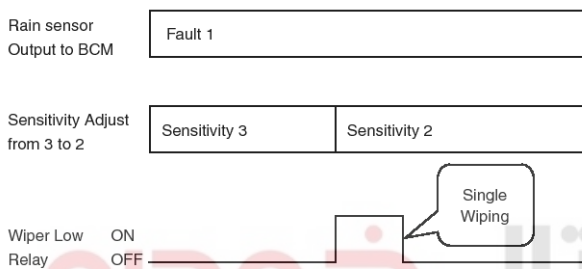
# Body Electrical System

## 5. Fault strategy for the rain sensor

### Rain Sensor Fault 1 - Internal Fault Detected

This failure is detected when the wiper is in automatic mode and the input faulty rain sensor from the rain sensor has a duty cycle corresponding to Fault 1. The confirmation delay for the failure is of 1 sec.

When this failure is detected, the wiper outputs are OFF and the wiper will also do a wipe in slow speed on the transition from sensitivity 3 to sensitivity 2 (Step 2 to 3) in order to signal the presence of this fault. If another sensitivity is set, the wiper won't make any additional wipe.

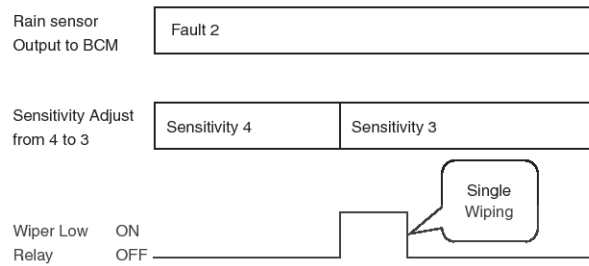


ETBF145H

### Rain Sensor Fault 2 - Glass Attachment Fault Detected

This failure is detected when the wiper is in automatic mode and the input faulty rain sensor from the rain sensor has a duty cycle corresponding to Fault 2. The confirmation delay for the failure is of 1 s.

When this failure is detected, the wiper outputs are OFF and the wiper will also do a wipe on the transition from sensitivity 4 to sensitivity 3 (Step 1 to 2) in order to signal the presence of this fault. If another sensitivity is set, the wiper won't make any additional wipe.



ETBF145I

### Rain Sensor Fault 3 - No Input Signal Present

This failure is detected when the wiper is in automatic mode and the input faulty rain sensor from the rain sensor has a duty cycle corresponding to Fault 3 or in case the duty cycle of the input faulty rain sensor is 0% or 100%. The confirmation delay for the failure is of 1 s.

When this failure is detected, the wiper outputs are OFF.

# Windshield Wiper/Washer

## BE-401

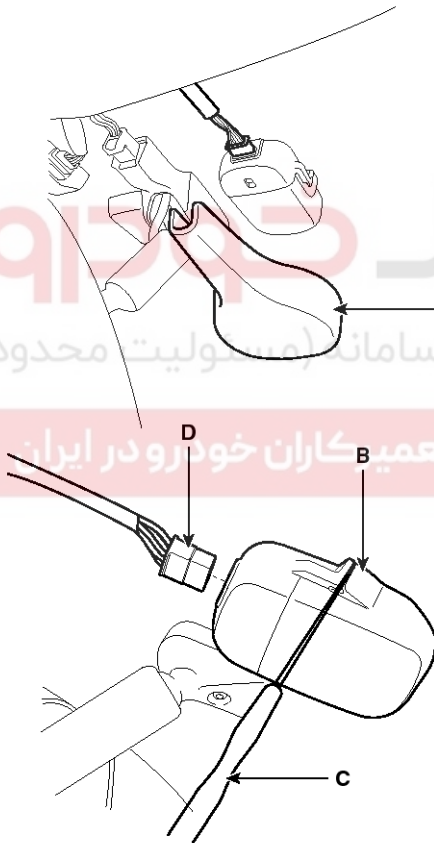
### Removal

#### ⚠ CAUTION

The rain sensor may not operate properly if contaminated. Protect the rain sensor surface by not removing the cover until installation time. The coupling pad on the rain sensor surface has adhesive strength. Take care when installing the sensor. If the sensor is separated from the windshield by force, the sensor or windshield may be damaged. Take care when removing the sensor.

1. Remove the rain sensor cover (A) first.

Be careful not to damage the cover latch by applying excessive force. To remove the latch, pull aside the latch using the cover hole (B) with the little (-) screwdriver (C).



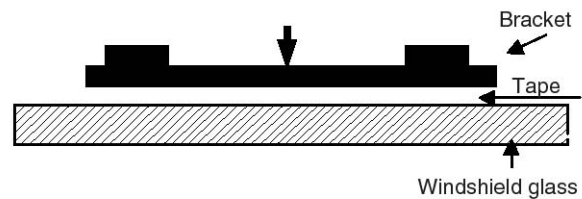
SVGB10096D

2. Remove the wiring harness connector from sensor.
3. Rain sensor module is attached to the front windshield by glue replacing the front windshield, remove the rain sensor module from the existing front windshield and install on the new front windshield.

### Installation

#### ⚠ NOTICE

- In case of the windshield with reflection layer which reflects the infrared rays in sensing field, remove the reflection layer from the rain sensor mounting position prior to installation.
  - Avoid contamination of the sensor during installation.
1. Install the rainsensor bracket to the windshield glass using the tape.



ETZE015I

#### ⚠ CAUTION

It is very important that the coupling pad pushes against the windshield completely to prevent bubbles from forming at the contact surface.

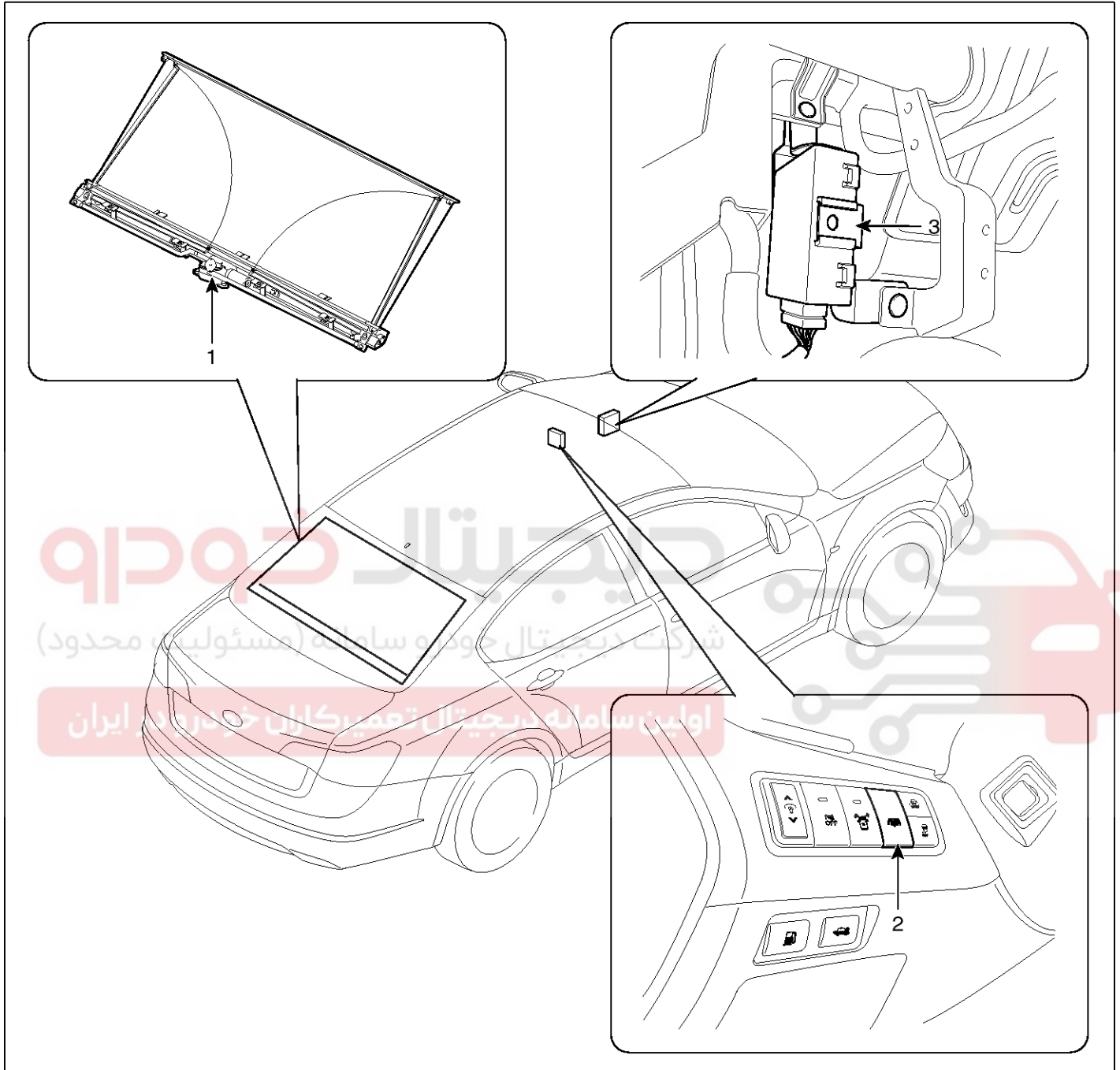
2. Connect the rainsensor connector, and then install the sensor cover.

# BE-402

# Body Electrical System

## Rear Curtain System

### Component Location



SVGBE0329L

- 1. Rear curtain
- 2. Rear curtain switch

- 3. Rear curtain unit

# Rear Curtain System

# BE-403

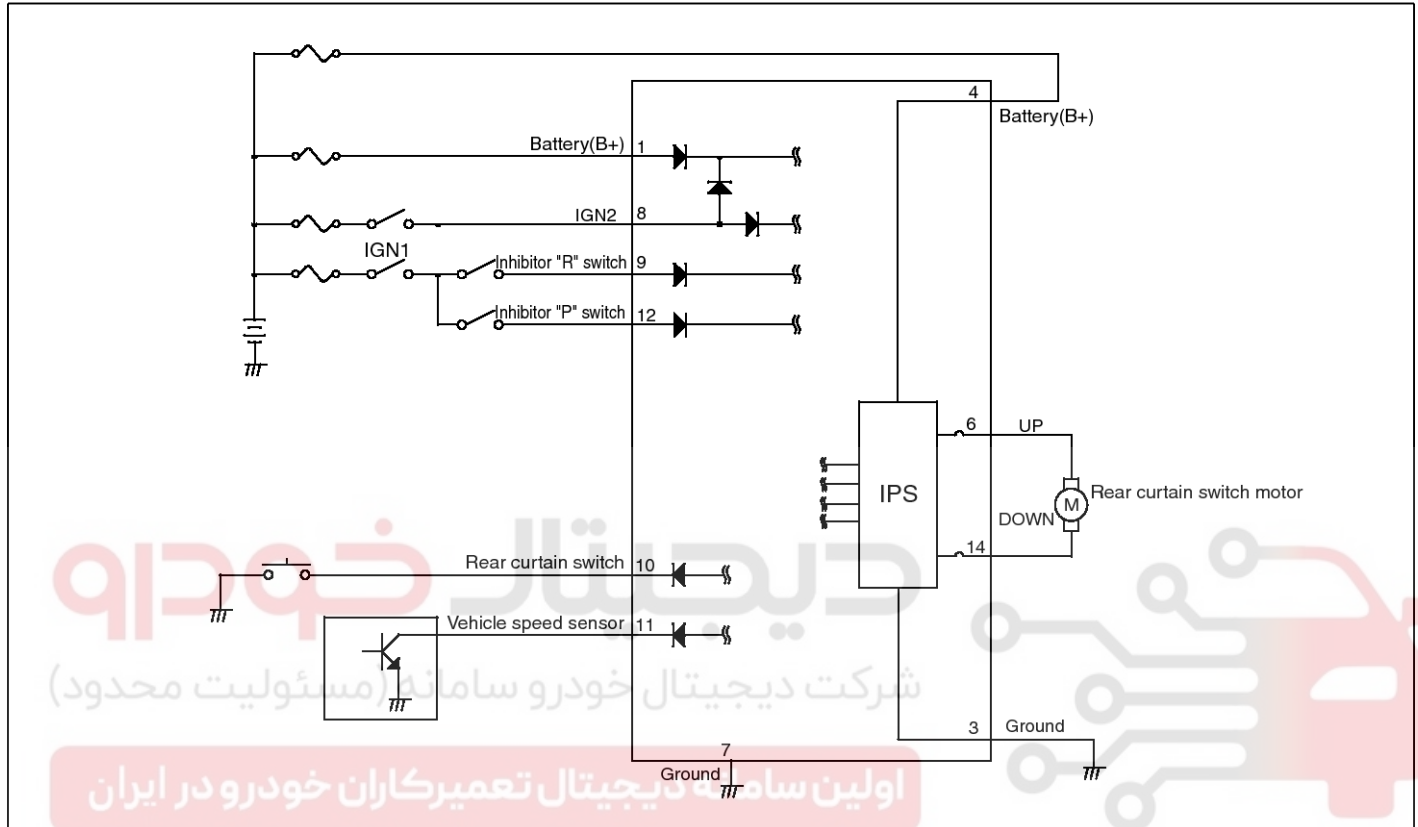
## Description

You can up & down rear curtain automatically by pressing the rear curtain switch. Rear curtain protect passenger from a direct ray of light by covering rear glass.

## NOTICE

The rear curtain provides shade for the rear seat passengers and can be raised or lowered by using the rear curtain switch.

## Circuit Diagram



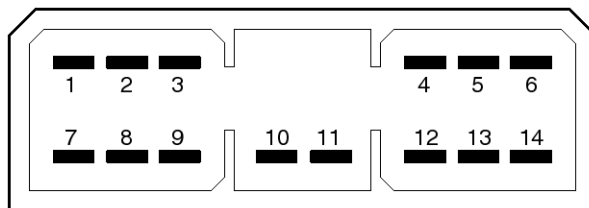
SVGBE0330L



## BE-404

## Body Electrical System

## Rear Curtain Unit Connector



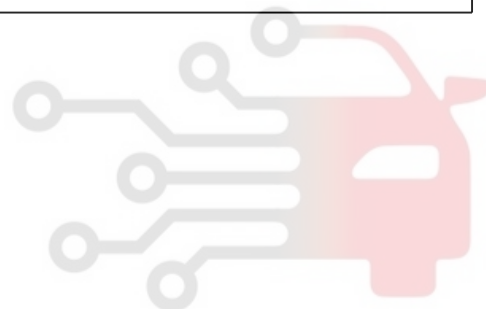
SVGBE0331L

| PIN NO. | Connector  | PIN NO. | Connector            |
|---------|------------|---------|----------------------|
| 1       | B+         | 8       | IG2                  |
| 2       | -          | 9       | Inhibitor "R" switch |
| 3       | Power GND  | 10      | Rear curtain switch  |
| 4       | Power B+   | 11      | Vehicle speed sensor |
| 5       | -          | 12      | Inhibitor "P" switch |
| 6       | Motor UP   | 13      | -                    |
| 7       | Signal GND | 14      | Motor DOWN           |

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



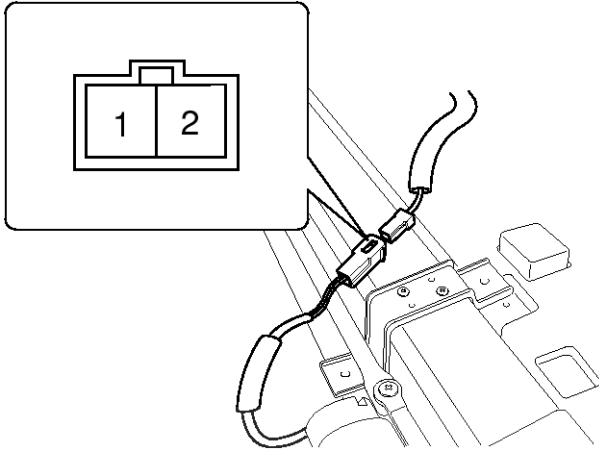
# Rear Curtain System

## BE-405

### Rear Curtain

#### Inspection

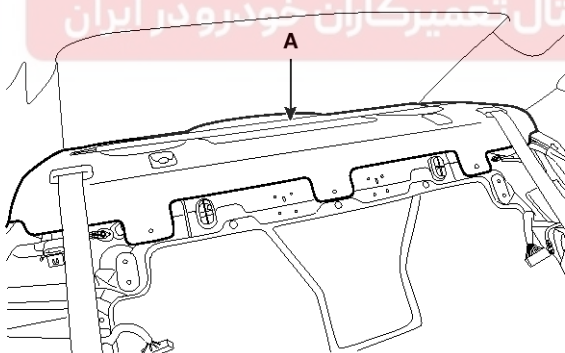
Connect the battery voltage and check the rear curtain motor rotation. If the motor does not operate properly, substitute with a known-good rear curtain motor and check for proper operation.



SVGBE0287D

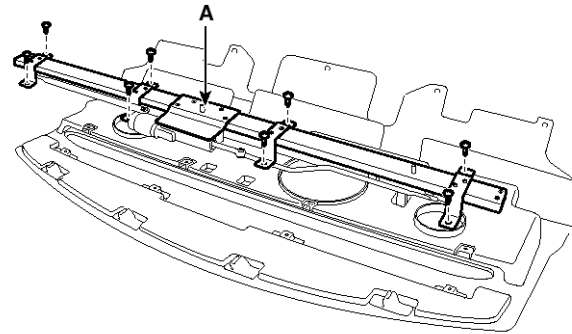
#### Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the rear package tray (A) after removing the rear seat. (Refer to the Body group- interior trim)



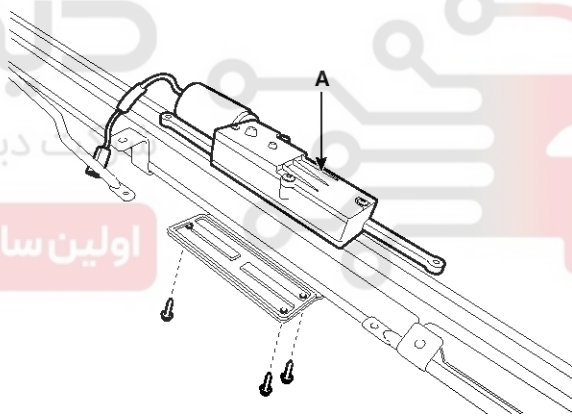
SVGB10131D

3. Remove the rear curtain (A) after removing the connector and bolts (8EA).



SVGBE0288D

4. If necessary of removing the rear curtain motor (A), remove the screws (3EA).



SVGBE0289D

#### Installation

1. Install the rear curtain and connector.
2. Install the rear package tray and rear seat.
3. Connect the negative (-) battery terminal.

# BE-406

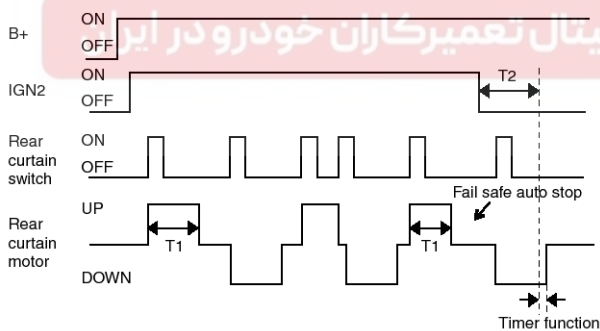
# Body Electrical System

## Rear Curtain Unit

### Inspection

1. AUTO UP/AUTO DOWN function
  - 1) IGN ON, if you press the rear curtain switch, rear curtain motor operates the reverse direction of the before direction. (UP/DOWN)
  - 2) After replacing battery, if you operates rear curtain switch, rear curtain is operated auto up.
  - 3) If the switch input occurred during rear curtain auto up or auto down, rear curtain is operated to the reverse direction after making a pause.
  - 4) AUTO function stop when detect an excess current.
2. TIMER function
  - 1) It can be possible to operate rear curtain for 30 sec after IGN OFF.
  - 2) It can be possible to operate rear curtain operation by the end of motor operation although timer is finished during auto up/ down.
3. FAIL SAFE function
 

If motor operation doesn't stop more than 10 sec after starting, motor is stopped by inner relay auto OFF.

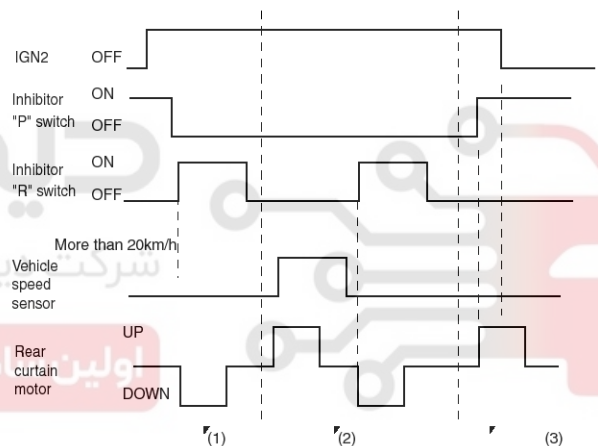


ETBF392B

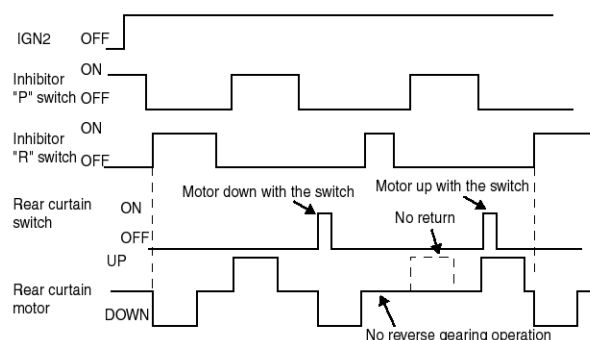
T1 : MAX 10 sec,  
T2 : 30 sec.

4. RETROGRESSION GEARING function
  - 1) When, rear curtain motor IGN ON, rear curtain UP and shift lever "R" position, rear curtain motor linked with the signal makes auto down.

- 2) When the vehicle speed is above 20 km/h from 1) condition, rear curtain motor linked with the signal makes auto up. Only, the motor does not operate below 20 km/h.
- 3) When shift lever position will be changed from R to P from 1) condition, rear curtain motor linked with the signal makes auto up. Only, the case where the driver presses the knock-down switch is excepted.
- 4) To the case where the driver presses the down switch from rear curtain up condition motor does not do a retrogression gearing operation and the up return operation due to a vehicle speed. After that, when driver presses the switch and the motor becomes auto up, the retrogression gearing operation is possible again.



SBHBE9484L



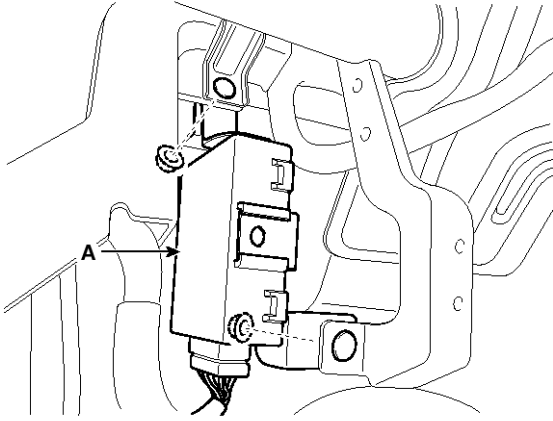
ETBF392D

# Rear Curtain System

## BE-407

### Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel. (Refer to the BD group - "Crash pad")
3. Remove the rear curtain unit (A) after removing nuts (2EA) and connector.



SVGBE0286D

### Installation

1. Install the rear curtain unit and connector.

#### **NOTICE**

*Make sure the connector are connected in properly.*

2. Install the crash pad lower panel.
3. Connect the negative (-) battery terminal.



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# BE-408

# Body Electrical System

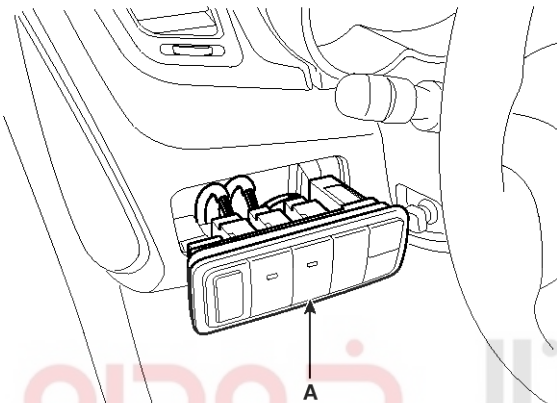
## Rear Curtain Switch

### Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the passenger compartment junction box cover.
3. Remove the crash pad side switch assembly (A) by pushing it through junction box cover hole.

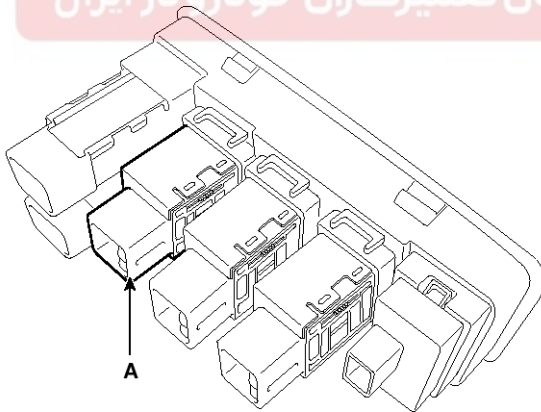
#### NOTICE

Put on gloves to protect your hands.



SVGBE0178D

4. Remove the rear curtain switch (A) after disconnecting the connectors.



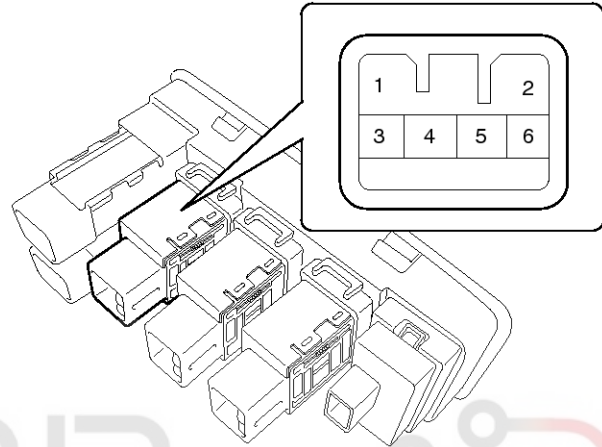
SVGBE0290D

### Installation

1. Install the rear curtain switch and connector to the crash pad.
2. Install the passenger compartment junction box cover.

### Inspection

1. Operate the switch and check for continuity between terminals with an ohmmeter.



SVGB10148D

| Position<br>Terminal | ON(Push) | OFF(Free) | Remarks          |
|----------------------|----------|-----------|------------------|
| 3                    |          |           | Up/Down          |
| 6                    |          |           | General          |
| 5                    |          |           | Illumination (-) |
| 2                    |          |           | Illumination (+) |

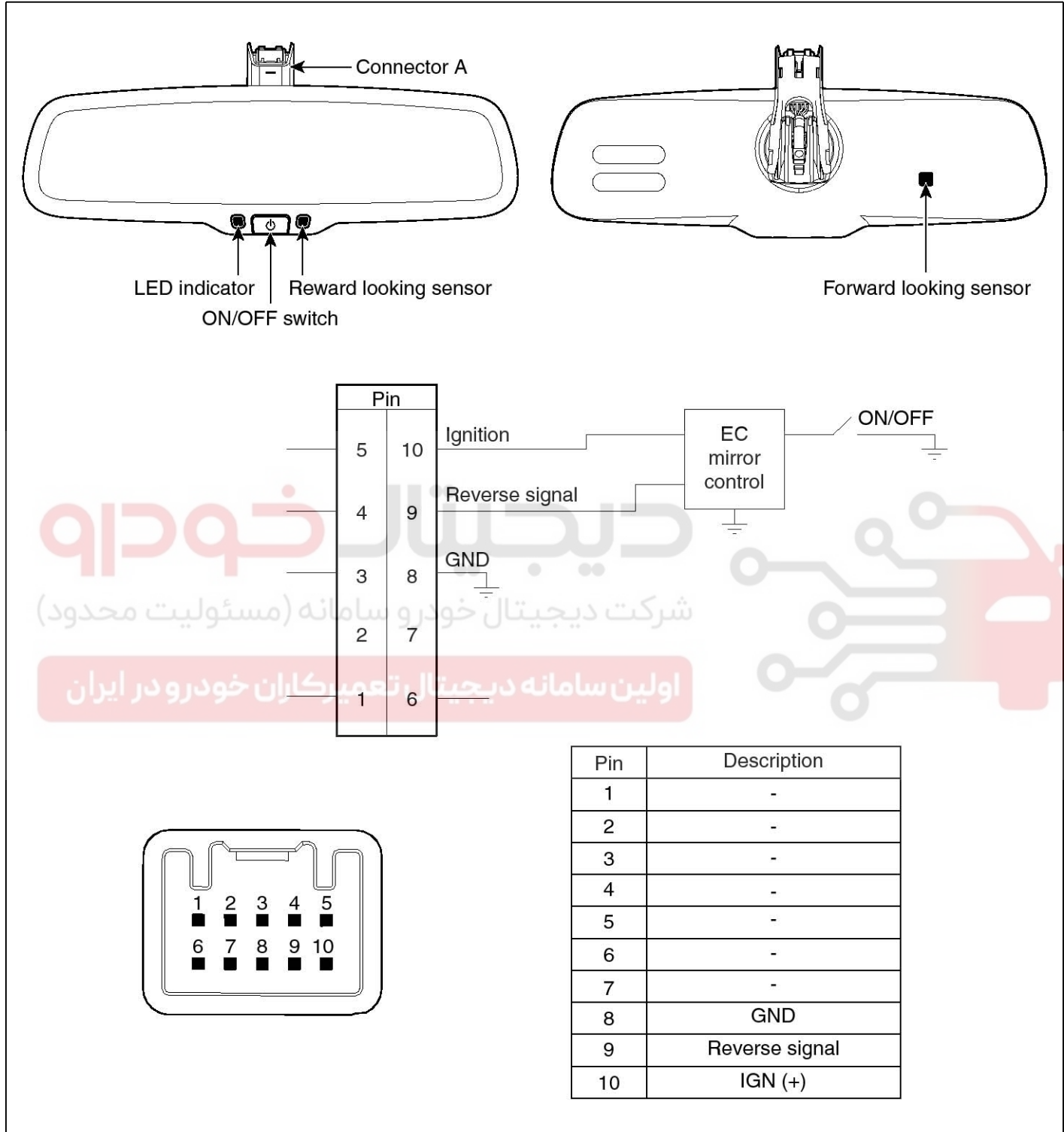
SVGBE0337L

# Electro chromic Inside Rear View Mirror

BE-409

## Electro chromic Inside Rear View Mirror

### Components (1)



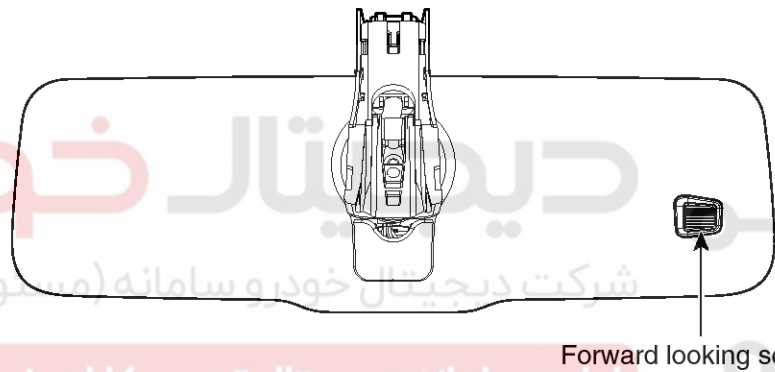
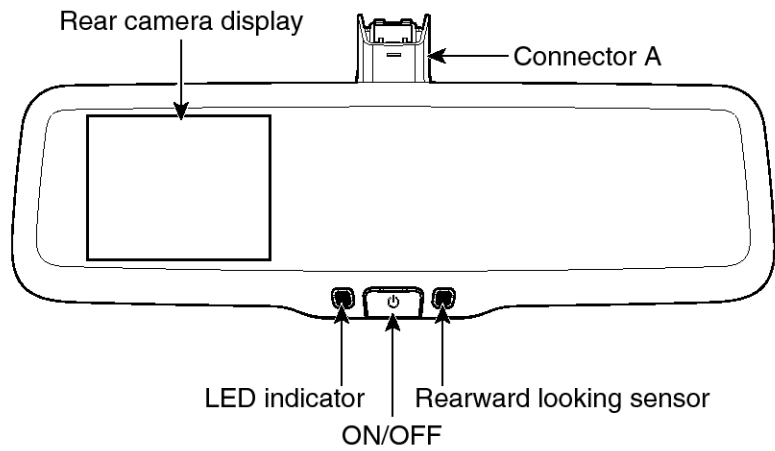
SVGBE0338L

# BE-410

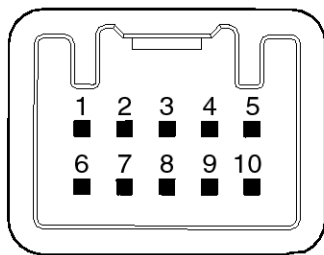
# Body Electrical System

## Components (2)

[Reverse Display]



دیجیتال خودرو  
 شرکت دیجیتال خودرو سامانه (مسئولیت محدود)  
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| Pin | Description      |
|-----|------------------|
| 1   | Camera power (-) |
| 2   | -                |
| 3   | Camera power (+) |
| 4   | Video (+)        |
| 5   | Video (-)        |
| 6   | -                |
| 7   | -                |
| 8   | GND              |
| 9   | Reverse signal   |
| 10  | IGN (+)          |

SLMBE0100N



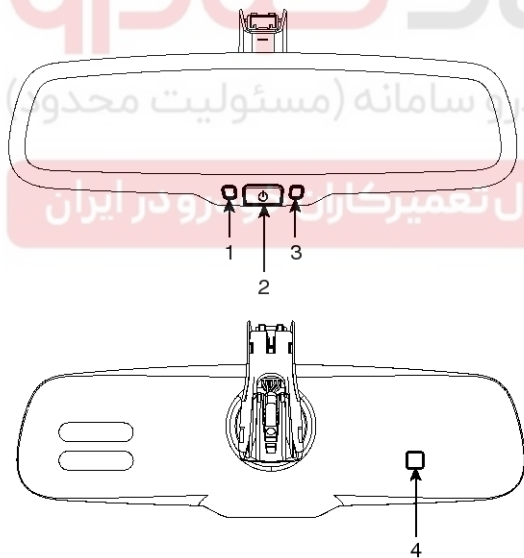
# Electro chromic Inside Rear View Mirror

# BE-411

## Description

The ECM (Electro Chromatic inside rear view Mirror) is for dimming the reflecting light from a vehicle behind at night, in order the user not to be dazzled by the light. The forward facing sensor detects brightness of the surroundings, while the rearward looking sensor the strength of the reflecting light so that adjusts the reflexivity of the mirror in the range of 7~85%. But, when the reverse gear is engaged, it stops functioning.

1. The forward facing sensor sees if the brightness of the surroundings is low enough for the mirror to operate its function.
  2. The rearward looking sensor detects glaring of the reflecting light from a vehicle behind.
  3. The ECM is darkened to the level as determined by the rearward looking sensor. When the glaring is no longer detected, the mirror stops functioning.
1. LED indicator
  2. ON/OFF Switch
  3. Rearward looking sensor
  4. Forward facing sensor



SXMBE9152L

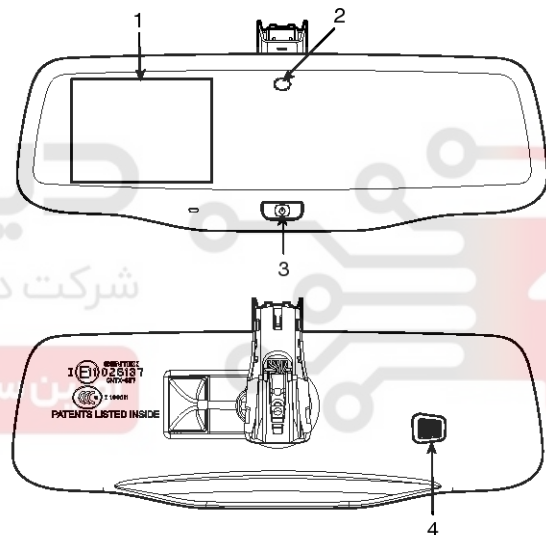
## Reverse Display Room Mirror

### Description

The back view camera system, located on the tailgate, provides a video image (which appears in the rear view mirror) of the area behind the vehicle. It adds assistance to the driver while reversing or reverse parking the vehicle.

To use the back view camera system, place the transmission in R (Reverse); an image will display on the left portion of the rear view mirror. The area displayed on the screen may vary according to the vehicle orientation and/or road condition.

1. Rear camera display
2. Rearward looking sensor
3. Power button
4. Forward facing sensor



SAMBE9408D

## BE-412

## Body Electrical System

Use the side mirrors and back view mirror to get better coverage on both sides and rear of the vehicle. When shifting out of reverse and into any other gear, the image will remain on for a few seconds before it shuts off to assist in parking or trailer hookup.

The camera lens for the back view camera system is located on the tailgate, near the tailgate handle. Keep the lens clean so the video image remains clear and undistorted. Clean the lens with a soft, lint-free cloth and non-abrasive cleaner.

### NOTICE

*If the back view camera system image is not clear or seems distorted, it may be covered with water droplets, snow, mud or any other substance. If this occurs, clean the camera lens before using the reverse camera system.*

### WARNING

The back view camera system is a reverse aid supplement device that still requires the driver to use it in conjunction with the back view mirror and the side mirrors for maximum coverage.

### WARNING

Objects that are close to either corner of the bumper or under the bumper, might not be seen on the screen due to the limited coverage of the back view camera system.

### WARNING

Backup as slow as possible since higher speeds might limit your reaction time to stop the vehicle.

### WARNING

Do not use the back view camera system with the tailgate open.

If the back end of the vehicle is hit or damaged, then check with your authorized dealer to have your rear video system checked for proper coverage and operation.

### Nighttime and dark area use

At night time or in dark areas, the back view camera system relies on the reverse lamp lighting to produce an image. Therefore it is necessary that both reverse lamps are operating in order to get a clear image in the dark. If either of the lamps are not operating, stop using the back view camera system, at least in the dark, until the lamp(s) are replaced and functioning.

### Inspection

Check it by the procedure below to see if the function of the ECM is normal.

1. Turn the ignition key to the "ON" position.
2. Cover the front sensor to stop functioning.
3. Shine a light at the rear sensor.
4. The ECM should be darkened as soon as the rear sensor detects the light.

### NOTICE

*If this test is performed in daytime, the ECM may be darkened as soon as the front sensor is covered.*

5. When the reverse gear is engaged, the ECM should not be darkened.
6. When heading lights to both the front and rear sensors, the ECM should not be darkened.

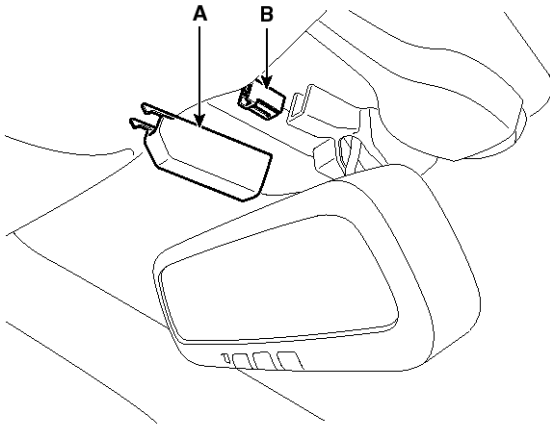


# Electro chromic Inside Rear View Mirror

## BE-413

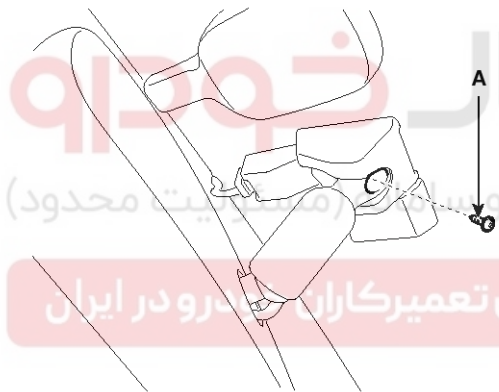
### Removal

1. Remove the mirror wiring cover (A) and disconnect mirror connector (B).



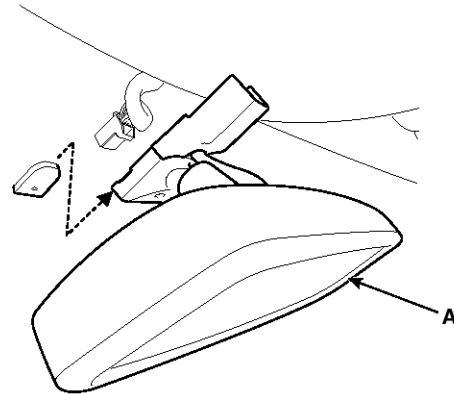
SVGB10152D

2. Remove the mounting screw (A).



SVGB10098D

3. Remove the mirror (A) pulling up in the arrow direction.



SAMBE9100D

### NOTICE

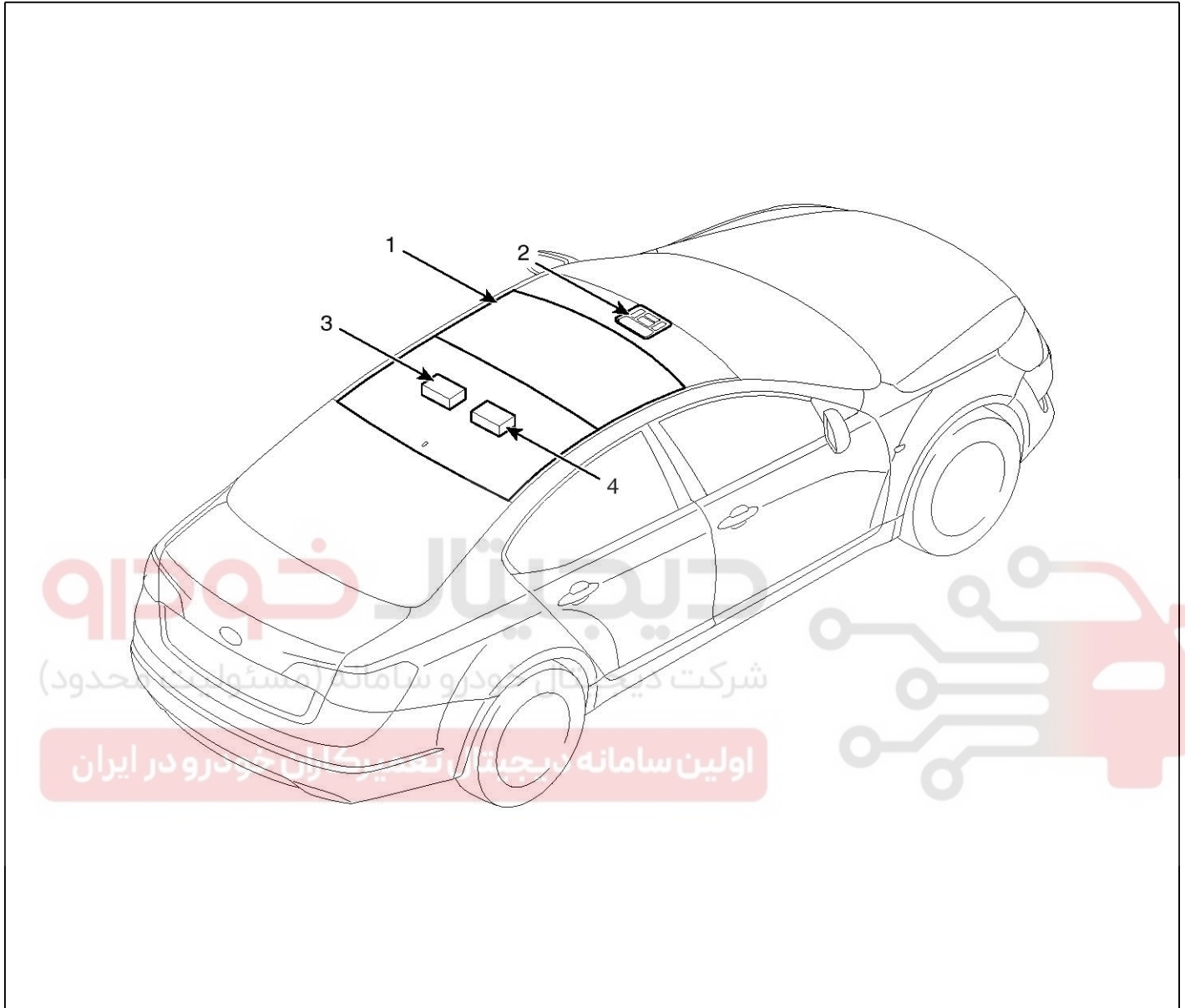
*Make sure not to damage the mounting bracket when removing the mirror.*

### Installation

1. Install the mirror making sure the mounting bracket not to be damaged.
2. Install the mirror wiring cover after reconnecting the connector and tightening the screw.

### NOTICE

*- Make sure the connector is plugged in properly.*

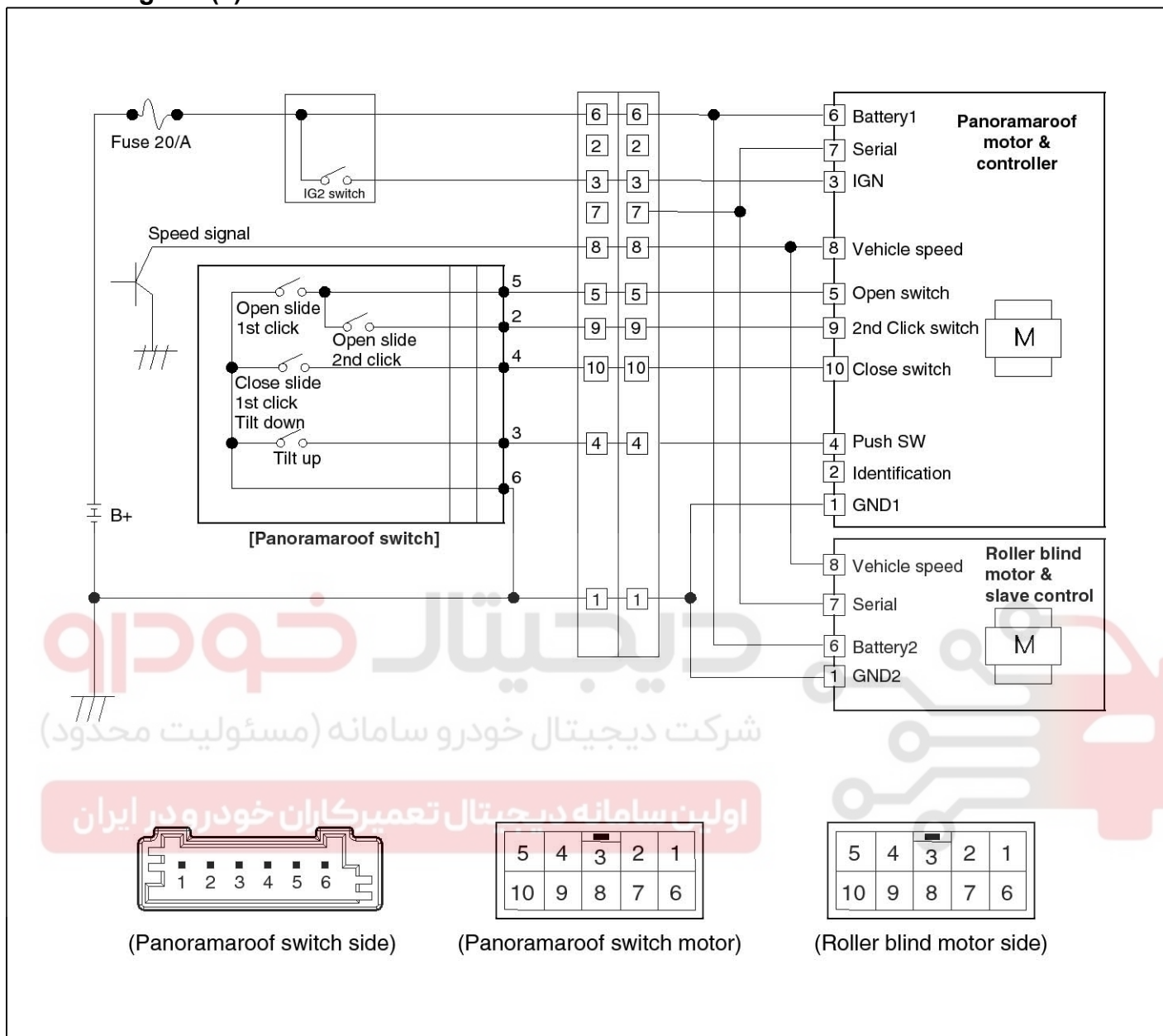
**BE-414****Body Electrical System****Panoramaroof****Component Location**

SVGBE0278D

# Panoramaroof

# BE-415

## Circuit Diagram (1)



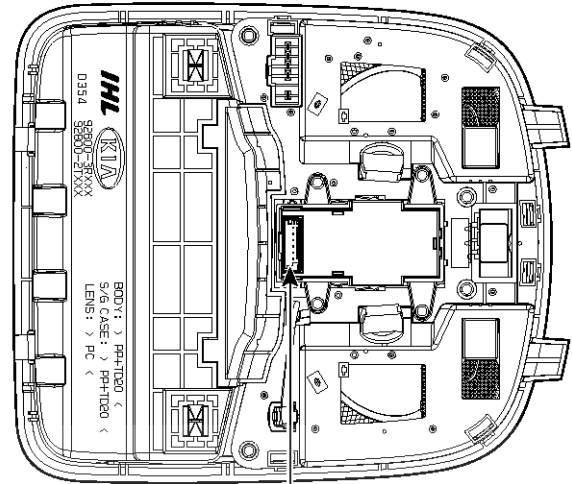
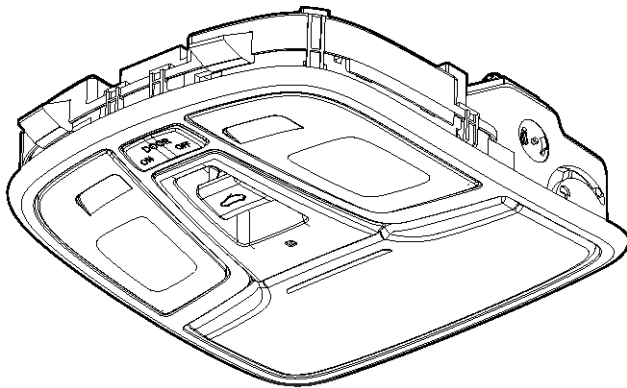
SVGBE0339L

# BE-416

# Body Electrical System

## Circuit Diagram (2)

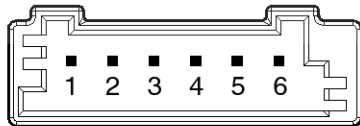
[Panoramaroof swich]



Panoramaroof swich

دیجیتال خودرو  
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

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| No. | Description |
|-----|-------------|
| 1   | Signal D    |
| 2   | Signal C    |
| 3   | Signal B    |
| 4   | Signal A    |
| 5   | -           |
| 6   | GND         |

SVGBE0340L

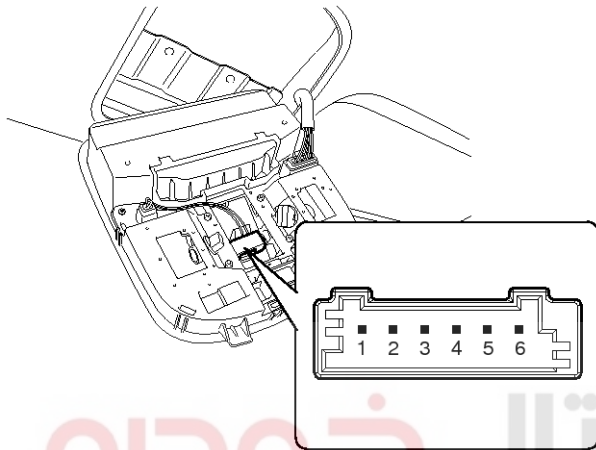
# Panoramaroof

# BE-417

## Panoramaroof Switch

### Inspection

1. Disconnect the negative (-) battery terminal.
2. Remove the overhead console lamp assembly.  
(Refer to the BD group - "Roof trim")
3. Check for continuity between the terminals. If the continuity is not as specified, replace the panoramaroof switch.



SVGBE0281D

| Terminal<br>Position | 6 | 5 | 4 | 3 | 2 |
|----------------------|---|---|---|---|---|
| Open (1st click)     | ○ | ○ |   |   |   |
| Open (2nd click)     | ○ | ○ |   |   | ○ |
| Tilt up              | ○ |   |   | ○ |   |
| Tilt down            | ○ | ○ | ○ |   |   |
| Close (1st click)    | ○ | ○ | ○ |   |   |
| Close (2nd click)    | ○ |   | ○ |   | ○ |

SYFBE0201L





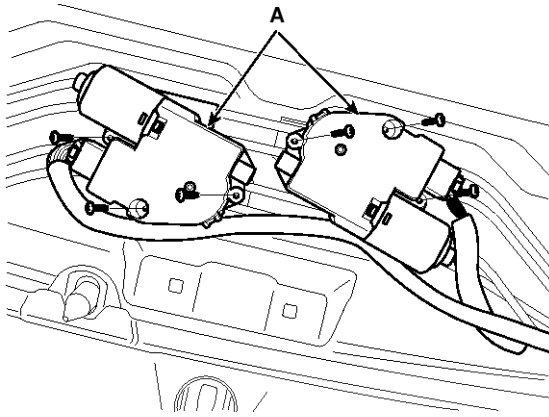
# BE-418

# Body Electrical System

## Panoramaroof Motor

### Inspection

1. Disconnect the negative (-) battery terminal.
2. Remove the roof trim.  
(Refer to the BD group - "Roof trim")
3. Disconnect the panoramaroof motor (A) connector.



SYFBD0077D

4. Ground the terminals as below table, and check that the panoramaroof unit operates.

**NOTICE**

- When inspecting the panoramaroof motor operation, panoramaroof motor and roller blind motor always should be connected.

| Terminal Position | 3 | 5 | 10 | 4 | 9 |
|-------------------|---|---|----|---|---|
| Open (1st click)  | ⊕ | ⊖ |    |   |   |
| Open (2nd click)  | ⊕ | ⊖ |    |   | ⊖ |
| Tilt up           | ⊕ |   |    | ⊖ |   |
| Tilt down         | ⊕ |   | ⊖  |   |   |
| Close (1st click) | ⊕ |   | ⊖  |   |   |
| Close (2nd click) | ⊕ |   | ⊖  |   | ⊖ |

SYFBE0203L

5. Make these input tests at the connector. If any test indicates a problem, find and correct the cause, then recheck the system. If all the input tests prove OK, the panoramaroof motor must be faulty; replace it.

| Terminal | Test condition       | Test: Desired result                                          |
|----------|----------------------|---------------------------------------------------------------|
| 3        | IG2 ON               | Check for voltage to ground: There should be battery voltage. |
| 1        | Under all conditions | Check for continuity to ground: There should be continuity.   |
| 6        | Under all conditions | Check for voltage to ground: There should be battery voltage. |

6. Ground the terminals as below table, and check that the roller blind motor operates.

| Terminal Position | 6 | 1 |
|-------------------|---|---|
| Motor             | ⊕ | ⊖ |

SYFBE0204L

# Panoramaroof

# BE-419

## Resetting The Panoramaroof

Whenever the vehicle battery is disconnected or discharged, or you use the emergency handle to operate the panoramaroof, you have to reset your panoramaroof system as follows :

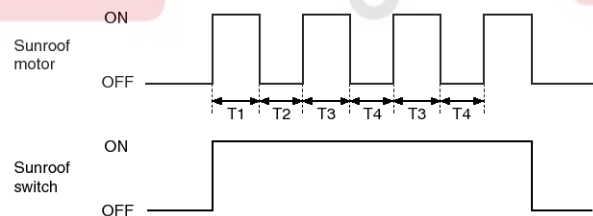
1. Turn the ignition key to the ON position and then close the panoramaroof completely.
2. Release the panoramaroof control lever.
3. Press and hold the CLOSE button for more than 10 seconds until the panoramaroof has moved slightly.
4. Release the panoramaroof control lever.
5. Press and hold the CLOSE button once again within 3 seconds until the panoramaroof do as follows;
  - Tilt → Slide Open → Slide Close
 Then release the lever.
6. Reset procedure of panorama system is finished.

## Protecting Motor From Overheating

In order to protect the panoramaroof motor from overheating from continuous motor operation, the panoramaroof ECU controls the Run-time and Cool-time of the motor as follows:

1. The panoramaroof ECU detects the Run- time of motor
2. Motor can be operated continuously for the 1st run-time( $120 \pm 10\text{sec.}$ ).
3. The continuous operation of motor stops after the 1st Run-time( $120 \pm 10\text{sec.}$ ).
4. Then Motor is not operated for the 1st Cool-time( $18 \pm 2\text{sec.}$ ).
5. Motor is operated for the 2nd Run-time( $10 \pm 2\text{sec.}$ ) at the continued motor operation after 1st Cool-time( $18 \pm 2\text{sec.}$ )
6. The continuous operation of motor stops operating after the 2nd Run-time( $10 \pm 2\text{sec.}$ )
7. Motor is not operated for the 2nd Cool-time( $18 \pm 2\text{sec.}$ ).
8. Motor repeats the 2nd run-time and 2nd cool-time at the continued motor operation.

- In case that motor is not operated continuously, the run-time is increased.
- The Run-Time of motor is initialized to "0" if the battery or fuse is reconnected after being disconnected, discharged or blown.



SHDBE6476L

T1 :  $120 \pm 10 \text{ sec.}$ , T2 :  $18 \pm 2 \text{ sec.}$ ,T3 :  $10 \pm 2 \text{ sec.}$ , T4 :  $18 \pm 2 \text{ sec.}$

## BE-420

## Body Electrical System

## Lighting System

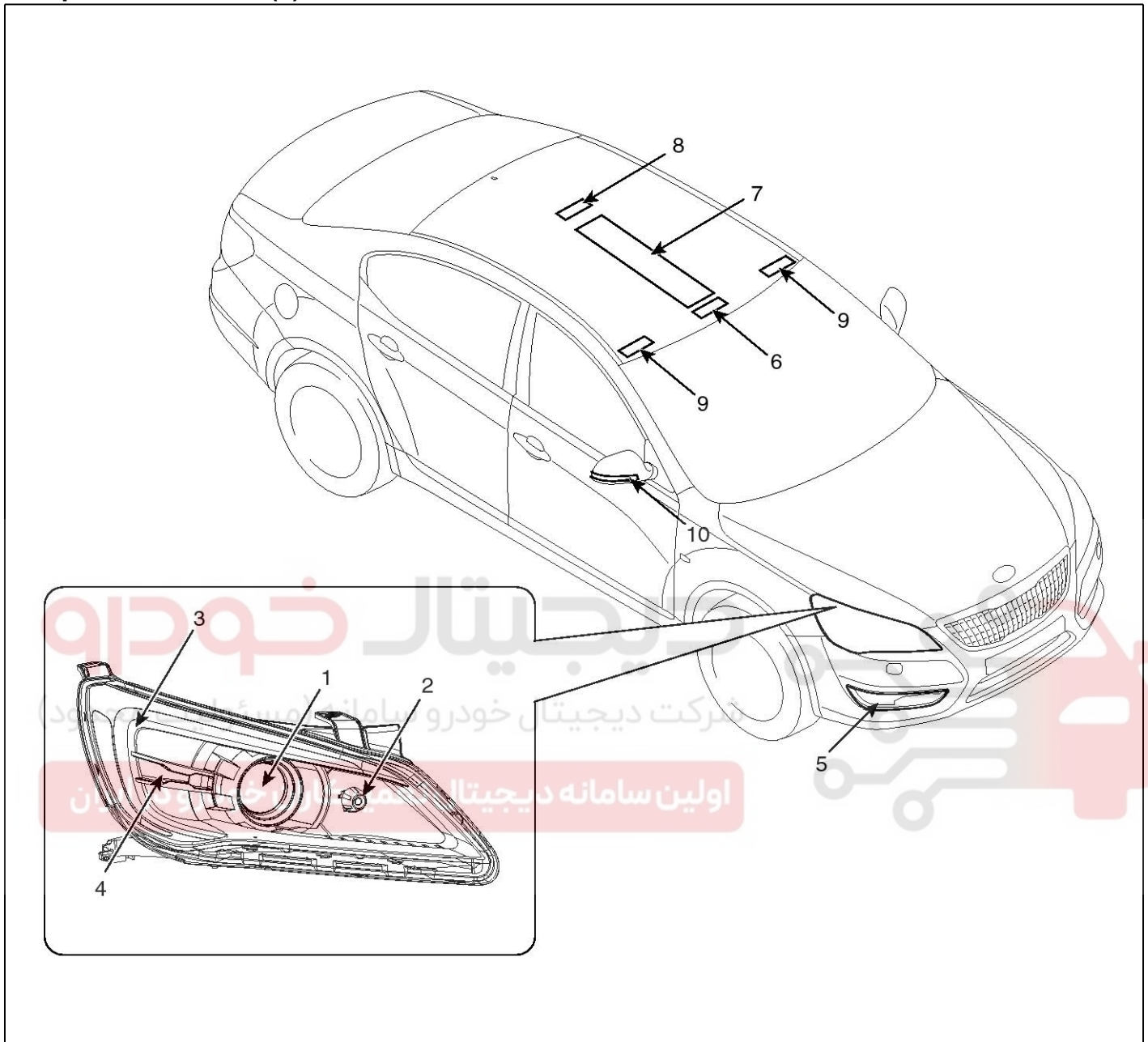
## Specification

| Item     |                             | Bulb Watt (W)         |        |
|----------|-----------------------------|-----------------------|--------|
| Front    | Head lamp (High)            | 55                    |        |
|          | Head lamp (Low)             | General               | 55     |
|          |                             | HID                   | 35     |
|          | Turn signal lamp            | 21                    |        |
|          | Position lamp               | LED                   |        |
|          | Fog lamp                    | 27                    |        |
|          | Turn signal lamp (Repeater) | LED                   |        |
| Rear     | Stop lamp/Tail lamp         | LED                   |        |
|          | Tail lamp                   | LED                   |        |
|          | Back up lamp                | 18                    |        |
|          | Fog lamp                    | 21                    |        |
|          | Turn signal lamp            | 21                    |        |
|          | License plate lamp          | 5                     |        |
|          | High mounted stop lamp      | LED                   |        |
| Interior | Deluxe                      | Overhead console lamp | LED    |
|          | General/<br>Panoramaroof    | Overhead console lamp | 10 x 2 |
|          |                             | Room lamp             | 10 x 2 |
|          | Trunk                       |                       | 5      |
|          | Vanity                      |                       | 5      |

# Lighting System

# BE-421

## Component Location (1)



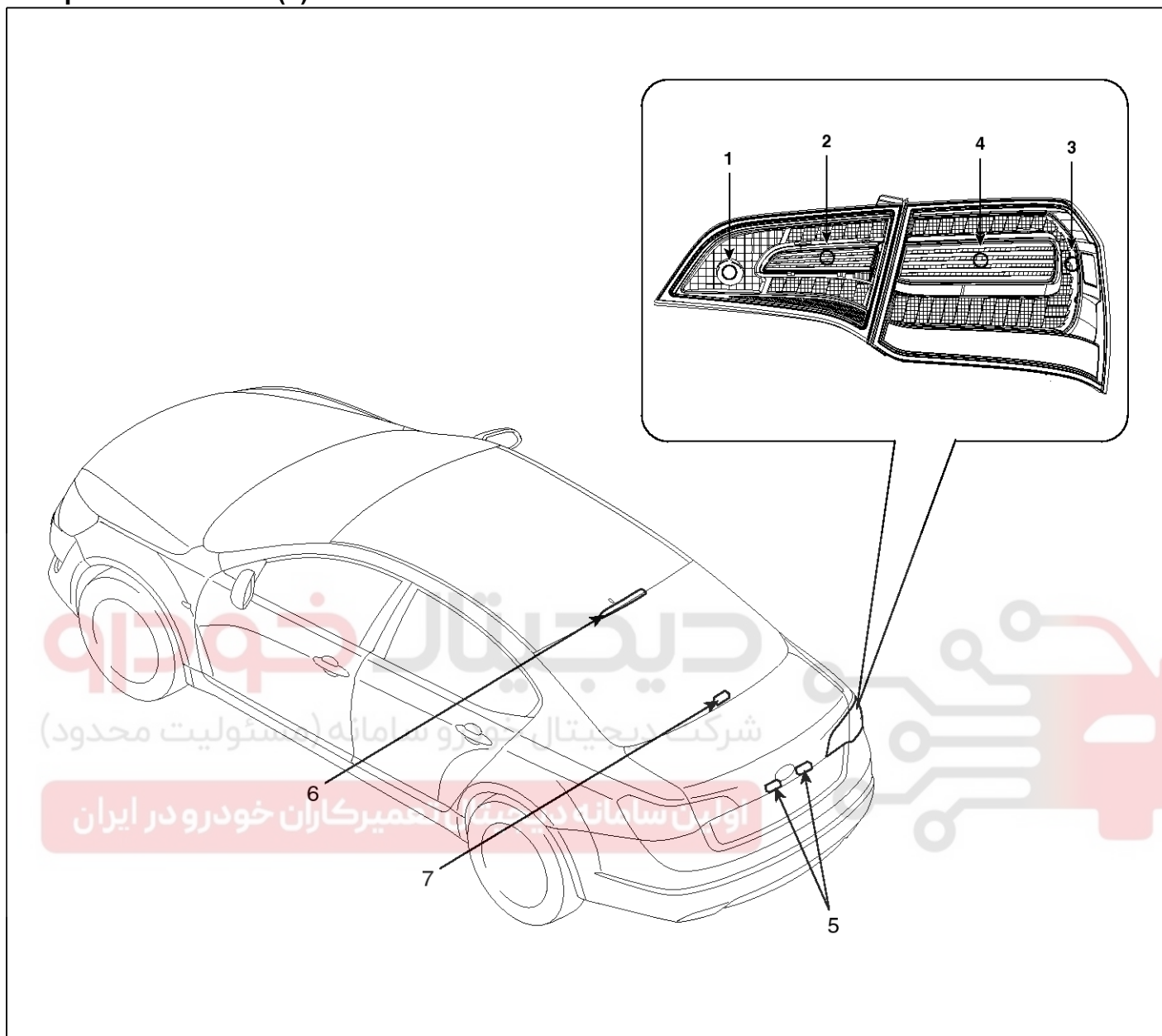
SVGBE0218D

- |                                                                                                                                                                                                 |                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>1. Head lamp (Low)</li> <li>2. Head lamp (High)</li> <li>3. Position lamp (LED)</li> <li>4. Front turn signal lamp</li> <li>5. Front fog lamp</li> </ul> | <ul style="list-style-type: none"> <li>6. Overhead console lamp (General/Panoramarroof)</li> <li>7. Deluxe overhead console lamp (Mood+Map+Room lamp)</li> <li>8. Room lamp</li> <li>9. Vanity lamp</li> <li>10. Door mirror turn signal lamp</li> </ul> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## BE-422

## Body Electrical System

## Component Location (2)



SVGBE0349L

1. Rear fog lamp
2. Back up lamp
3. Tail/Stop lamp (LED)
4. Turn signal lamp

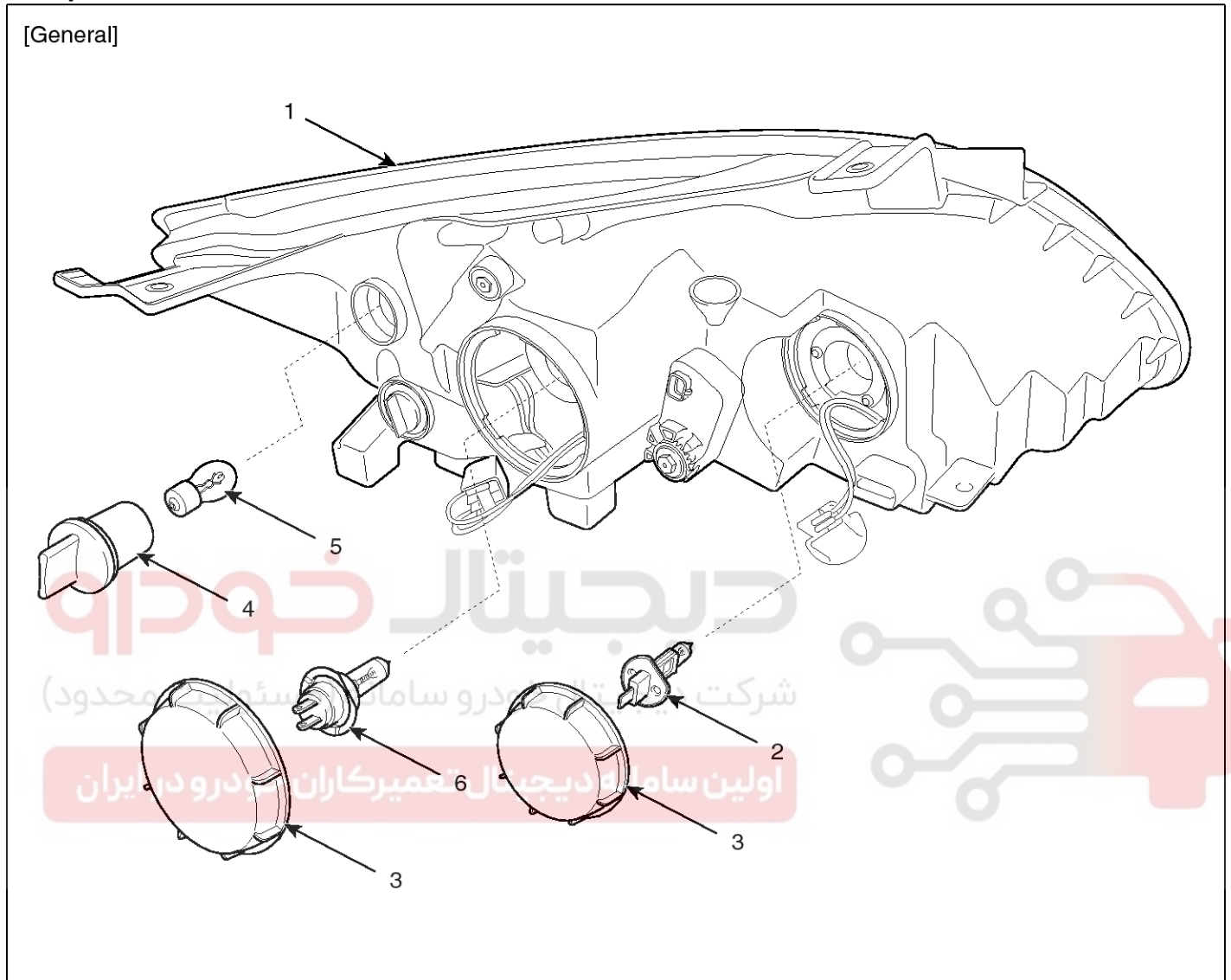
5. License plate lamp
6. High mounted stop lamp
7. Luggage lamp

# Lighting System

# BE-423

## Head Lamps

### Component



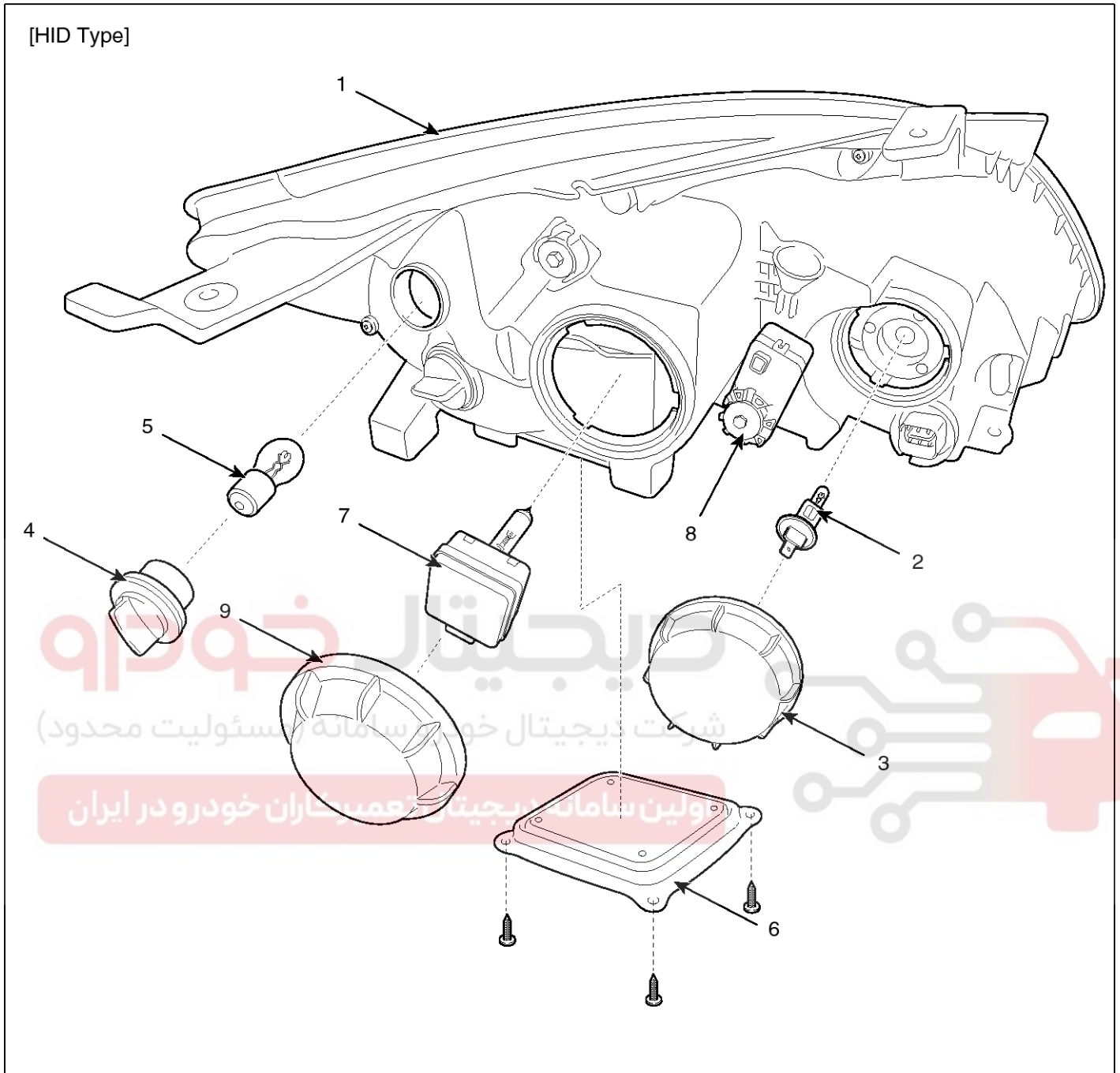
SVGBE0341L

- 1. Head lamp assembly lens & housing
- 2. Head lamp (High) lamp
- 3. Dust cap

- 4. Socket
- 5. Turn signal/Tail lamp
- 6. Head lamp (Low) lamp

BE-424

Body Electrical System



SVGBE0342L

- 1. Head lamp assembly lens & housing
- 2. Head lamp (High) lamp
- 3. Dust cap
- 4. Socket
- 5. Turn signal/Tail lamp

- 6. Ballast
- 7. Head lamp (Low) lamp (HID) & ignitor
- 8. Head lamp levelling actuator
- 9. Dust cover (Low)



# Lighting System

## BE-425

### HID Head Lamp

#### 1. Bulb

##### 1) Elements

Xenon gas: Xenon gas activates the initial reaction for rapid illuminating.

Molybdenum electrode: anode arcing

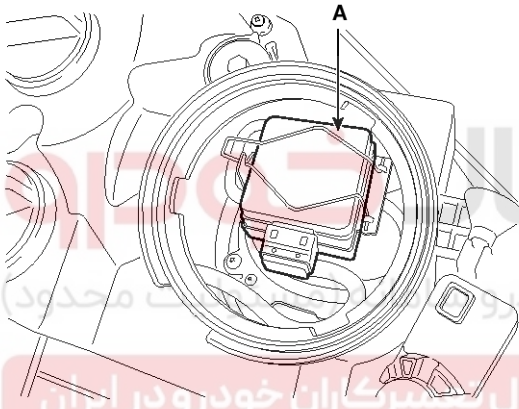
Metal halide salts: color composing component

##### 2) Lightening principle

When Xenon gas and metal halide salt will discharge the molybdenum anode in a capsule, it emits light.

#### 2. Ignitor

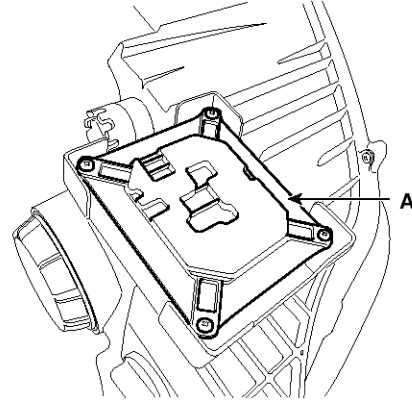
Ignitor (A) is an electromagnetic transformer that receives current from ballast and boost voltage to light on the arc light source in any environment.



SVGBE0222D

#### 3. Ballast

- 1) Ballast (A) delivers an instant high voltage pulse to the ignitor electrode, to initialize discharge in the source.
- 2) Ballast supplies the stable power to the bulb and the ignitor during initialization and normal state of arc.



SVGBE0223D

#### 4. Stability

- 1) Durable for vibration as there is no filament.
- 2) Does not operate if polarity are changed.
- 3) Doesn't operate if the input voltage is not in the range of 10-16V.
- 4) Doesn't operate if the circuit is short.
- 5) Doesn't operate if the bulb burnt out.

## BE-426

## Body Electrical System

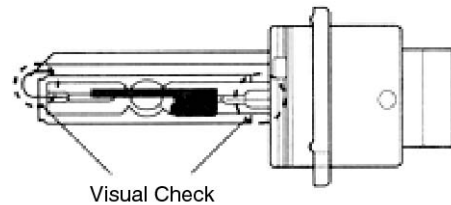
## Inspection

1. Check-points upon head lamp failure (HID)
  - 1) Check the battery voltage. (Low beam will be on when the battery voltage above 9V.)
  - 2) Check the fuse and relay.
  - 3) Check the polarity of ballast. (If the polarity are changed, low beam doesn't lighten)
  - 4) Check the bulb connector securely.
  - 5) Visually bulb checking (no filament): damaged glass, damaged for upper parts and lower parts of glass tube.

- 6) After (1)~(5), replace the ballast and the ignitor. (ballast assembly).

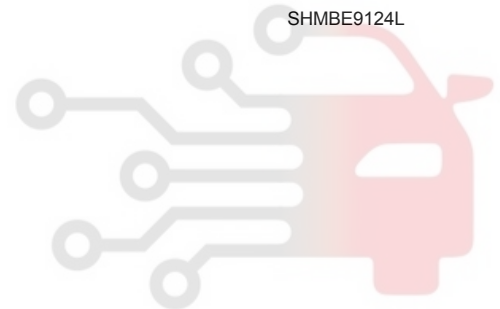
**CAUTION**

If a headlamp goes out after a period of operation but will immediately relights when the headlamp switch is cycled it is likely the HID lamp needs to be replaced.



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# Lighting System

## BE-427

### 2. Service procedure and warning (HID)

| No. | Item                                               | Service procedures                                                                                                                                                                                                                                                                                                                                                                                     | Warning                                                                                                                                                                                                                                                    | Remarks                                                                                                                                                         |
|-----|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Replacement of lamp assembly                       | <ol style="list-style-type: none"> <li>1. Disconnect the power connector from the lamp.</li> <li>2. Remove and replace the lamp assembly.</li> <li>3. Connect the power connector.</li> </ol>                                                                                                                                                                                                          | <ul style="list-style-type: none"> <li>• Disconnect the head lamp power connector to avoid high voltage.</li> </ul>                                                                                                                                        | <ul style="list-style-type: none"> <li>• Other description is the same as the halogen bulbs.</li> </ul>                                                         |
| 2   | Replacement of the Bulb                            | <ol style="list-style-type: none"> <li>1. Disconnect the power connector from the lamp. (head lamp, turn signal, head lamp leveling device)</li> <li>2. Remove the lamp assembly.</li> <li>3. Remove the ballast and dust cover.</li> <li>4. Remove the bulb socket and replace the bulb.</li> <li>5. Installation is the reverse of removal.</li> </ol>                                               | <ul style="list-style-type: none"> <li>• Disconnect the head lamp power connector to avoid high voltage.</li> <li>• Be careful not to damage the bulb and use genuine bulbs only.</li> <li>• Do not apply excessive force and fit it correctly.</li> </ul> |                                                                                                                                                                 |
| 3   | Replacement of the Ballast (with built-in ignitor) | <ol style="list-style-type: none"> <li>1. Disconnect the power connector from the lamp.</li> <li>2. Remove the lamp and then the ballast and the dust cover.</li> <li>3. Remove the head lamp leveling device and then the bulb socket.</li> <li>4. Connect the bulb socket on the replacement ballast and install the leveling device.</li> <li>5. Installation is the reverse of removal.</li> </ol> | <ul style="list-style-type: none"> <li>• Disconnect the head lamp power connector to avoid high voltage.</li> </ul>                                                                                                                                        | <ul style="list-style-type: none"> <li>• Replace the ballast only and install the used lamp.</li> <li>• Replace the sub assembly except the ballast.</li> </ul> |
| 4   | Others                                             | <ol style="list-style-type: none"> <li>1. Power supply should be according to the rated capacity.</li> <li>2. Use the rated fuse and wire.</li> <li>3. Bulb socket shall be free from moisture or dirt.</li> <li>4. Do not apply the ballast severe shock, water, or extreme</li> </ol>                                                                                                                | <ul style="list-style-type: none"> <li>• All parts should be serviced only at specified service centers.</li> </ul>                                                                                                                                        | <ul style="list-style-type: none"> <li>• HID lamp should not be installed on other cars (Dangerous, fire may occur.)</li> </ul>                                 |

#### CAUTION

HID lamp shall not be used on other cars.(Fire may occur.)

Fire may occur when HID lamp initially lights due to the fact that arc-discharge generates high voltage (max. 30,000V) and high current (12-13A), and are different from the halogen lamp specification.

## BE-428

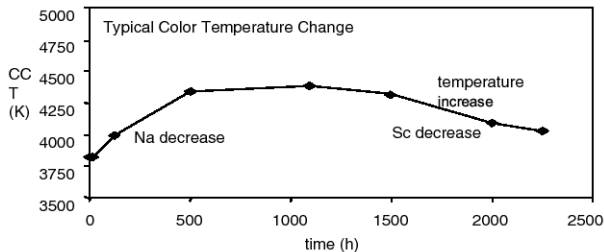
## Body Electrical System

3. Understanding of color change by replacement of HID bulb.

1) The cause of HID color change.

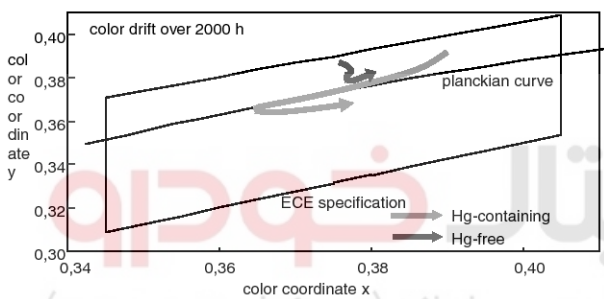
(Change of color is HID feature)

- The change of color occur during mixing three Elements in the HID bulb.



SYFBE0295L

- Color Coordinates by Lifetime



SYFBE0296L

- Chemical compounds in an arc tube :

1. Xenon gas(an inert gas , protection of arc tube)
2. Mercury( increase voltage, protection of arc tube, blue in the first 3 second )
3. Metal halide
  - Natrium(Yellow) : 0.12mg
  - Scandium(Blue) : 0.06mg
  - Iodine(Halogen) : 0.02mg

2) Change of Color by Lighting Up Time

- It needs 4 seconds at least for stabilization.  
At first, you can see the blue for 3 seconds because of Mercury.
- After stabilization, change of color occur by metal halide.
  - 0 Hour : Yellow( Na is more than Sc. )
  - 10 Hour : Bright Blue (Na and Sc are similar ratio.)
  - 1000Hour more : Blue ( Sc is more than Na.)
- The end of lifetime : When HID used up Natrium and Scandium, a beam of light will be dark suddenly.  
so you can see the red, purple and turn on and off.

### Characteristic

1. Durable for vibration as there is no filament.
2. HID lamp had a more long life than halogen lamp.
3. Does not operate if polarity is changed.
4. Operating input voltage : 9-16V

# Lighting System

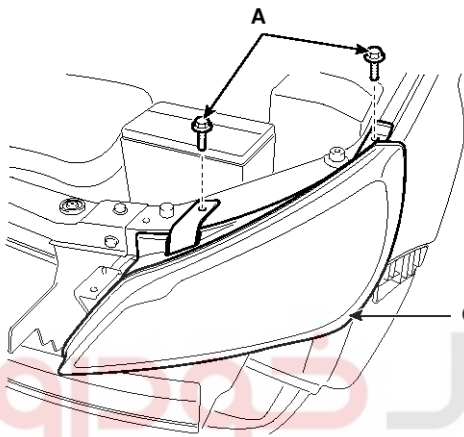
## BE-429

### Removal

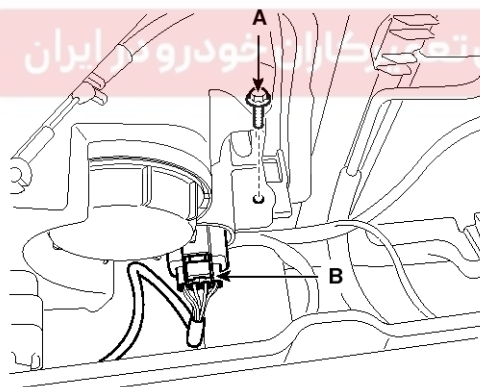
1. Disconnect the negative (-) battery terminal.
2. Remove the front bumper.  
(Refer to the BD group - "Front bumper")
3. Loosening the head lamp mounting bolts (A) (4EA) and disconnect the head lamp connector (B). Then, remove the head lamp assembly (C).

#### NOTICE

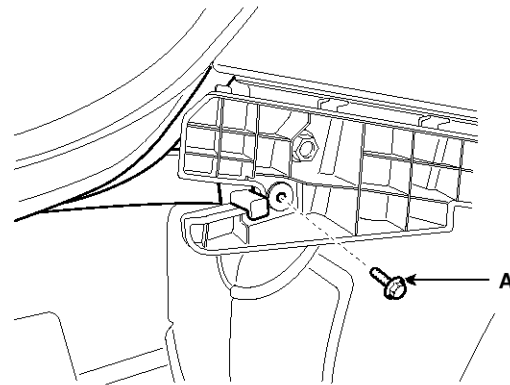
- Take care not to scratch the head lamp lens or fender.



SVGBE0224D



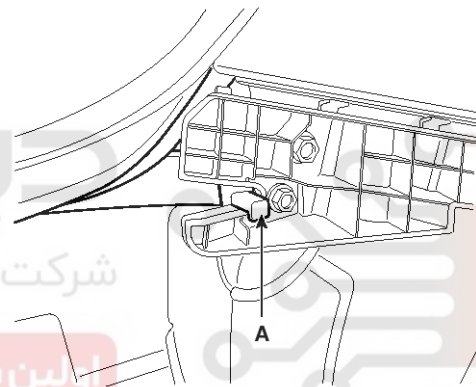
SVGBE0225D



SVGBE0226D

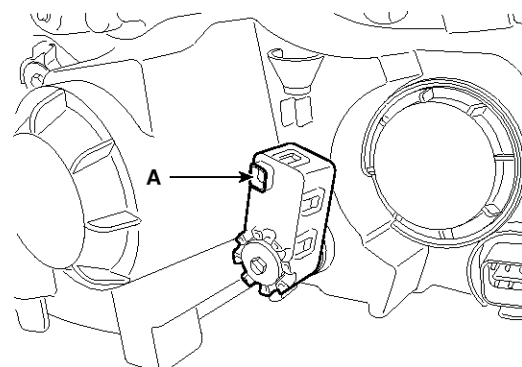
#### NOTICE

- Take care that holding clip (A) is not to be damaged.



SVGBE0227D

4. In case of HID type, disconnect the head lamp leveling actuator connector (A).



SVGBE0228D

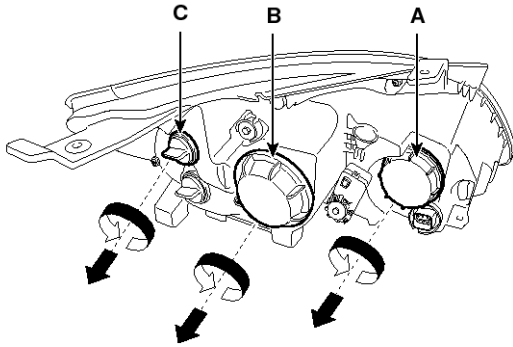
**BE-430****Body Electrical System**

5. Remove the dust caps from the head lamp assembly after turning in the counter clock-wise direction.

A : Head Lamp (High) Cap

B : Head Lamp (Low) Cap

C : Turn Signal Lamp



SVGBE0229D

**Installation**

1. Install the head lamp bulbs.
2. Connect the connectors.
3. Install the head lamp bolts (4EA) in alphabetical order.
4. Connect the negative (-) battery terminal.

**Head Lamp Aiming Instructions****<Mechanical aiming>**

The head lamps should be aimed with the proper beam-setting equipment, and in accordance with the equipment manufacturer's instructions.

**NOTICE**

*If there are any regulations pertinent to the aiming of head lamps in the area where the vehicle is to be used, adjust so as to meet those requirements.*

Alternately turn the adjusting gear to adjust the head lamp aiming. If beam-setting equipment is not available, proceed as follows:

1. Inflate the tires to the specified pressure and remove any loads from the vehicle except the driver, spare tire, and tools.
2. The vehicle should be placed on a flat floor.
3. Draw vertical lines (Vertical lines passing through respective head lamp centers) and a horizontal line (Horizontal line passing through center of head lamps) on the screen.

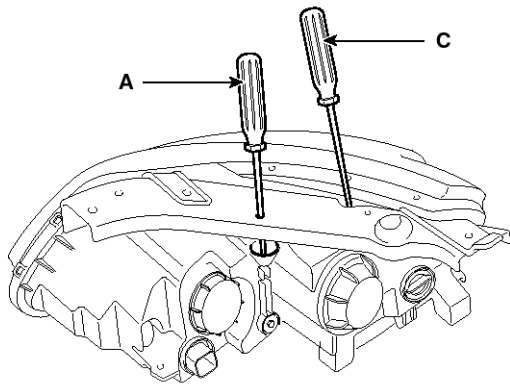
# Lighting System

# BE-431

4. With the head lamp and battery in normal condition, aim the head lamps so the brightest portion falls on the horizontal and vertical lines.

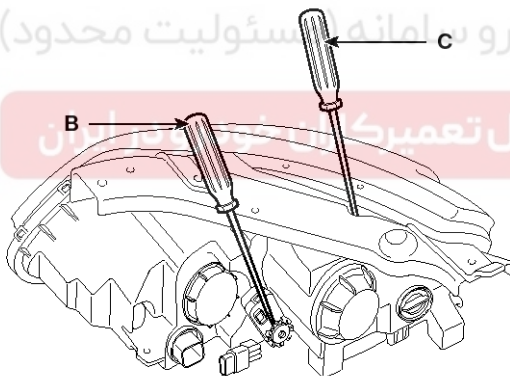
- A : Vertical
- B : Vertical (HID)
- C : Horizontal

**[General type]**



SVGBE0363D

**[HID type]**

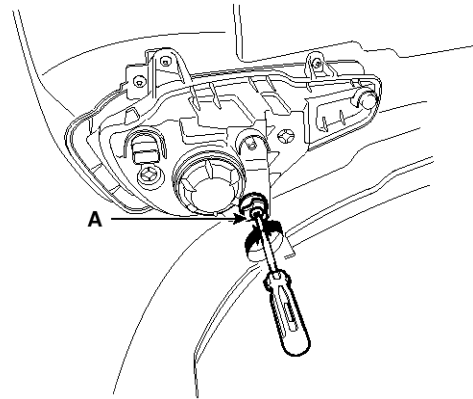


SVGBE0364D

## Front Fog Lamp Aiming

The front fog lamps should be aimed as the same manner of the head lamps aiming.

With the front fog lamps and battery normal condition, aim the front fog lamps by turning the adjusting screw (A) with a driver.



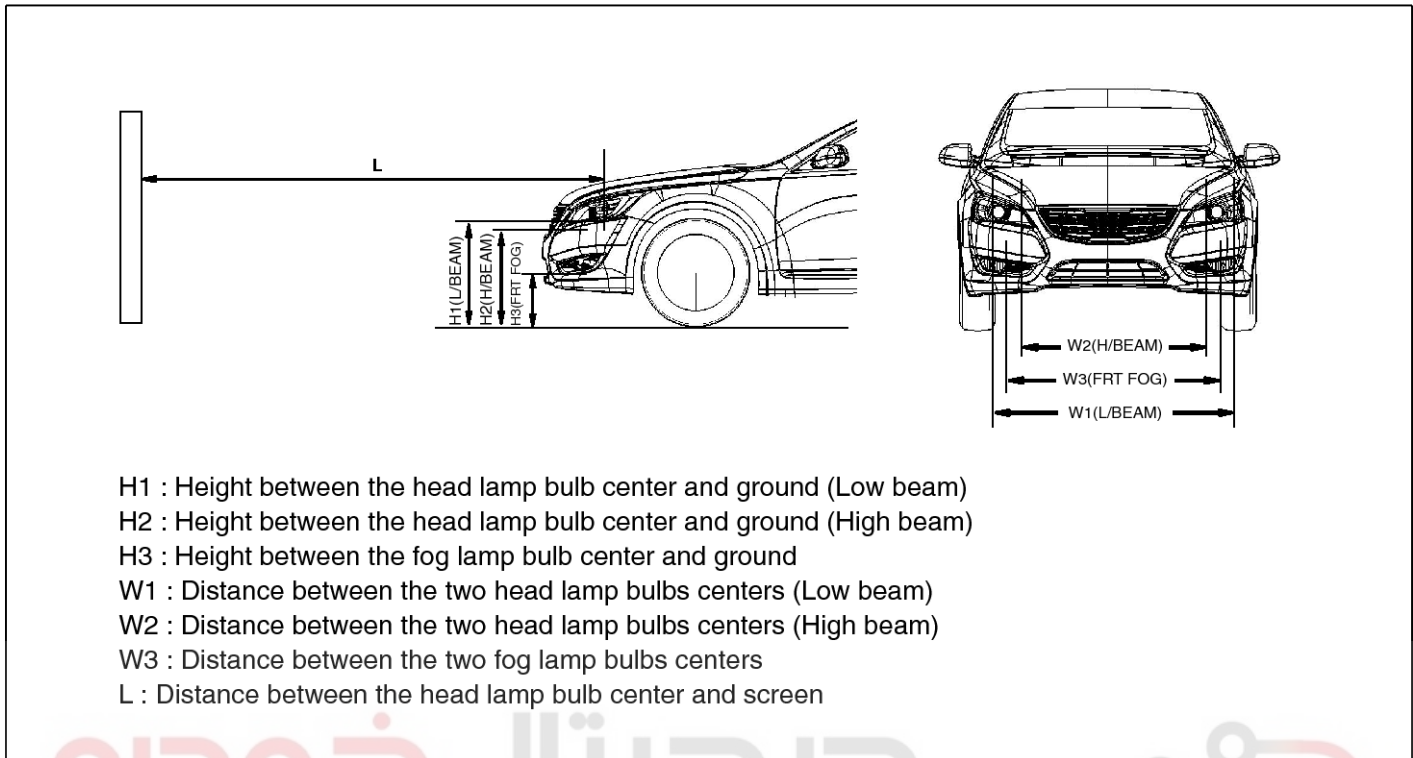
SVGBE0239D



# BE-432

# Body Electrical System

## Head Lamp And Fog Lamp Aiming Point



SVGBE0343L

Unit : in(mm)

| Vehicle condition | H1        | H2        | H3        | W1         | W2         | W3         | L                         |
|-------------------|-----------|-----------|-----------|------------|------------|------------|---------------------------|
| Without driver    | 27.4(696) | 26.2(665) | 14.4(367) | 52.8(1343) | 43.7(1110) | 55.9(1422) | Refer to aiming condition |
| With driver       | 27.1(688) | 25.8(657) | 14.1(359) |            |            |            |                           |

SVGBE0350L

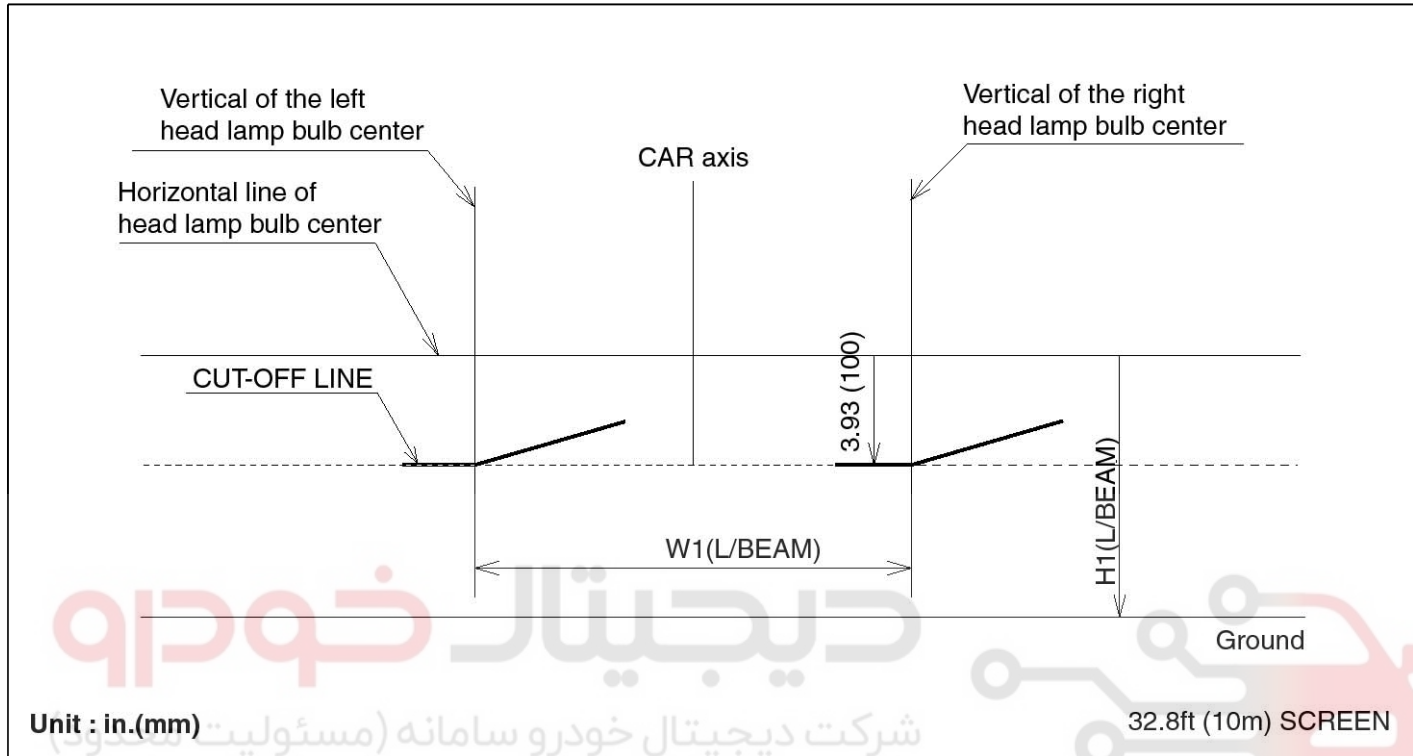
# Lighting System

## BE-433

### 1. Head Lamp (Low beam)

- Turn the low beam on without driver aboard.
- The cut-off line should be projected in the cut-off line shown in the picture.

- When aiming the low beam, vertical aiming should be adjusted after adjusting the horizontal aiming.
- If head lamp leveling device is equipped, adjust the head lamp leveling device switch with 0 positions.



SVGBE0344L

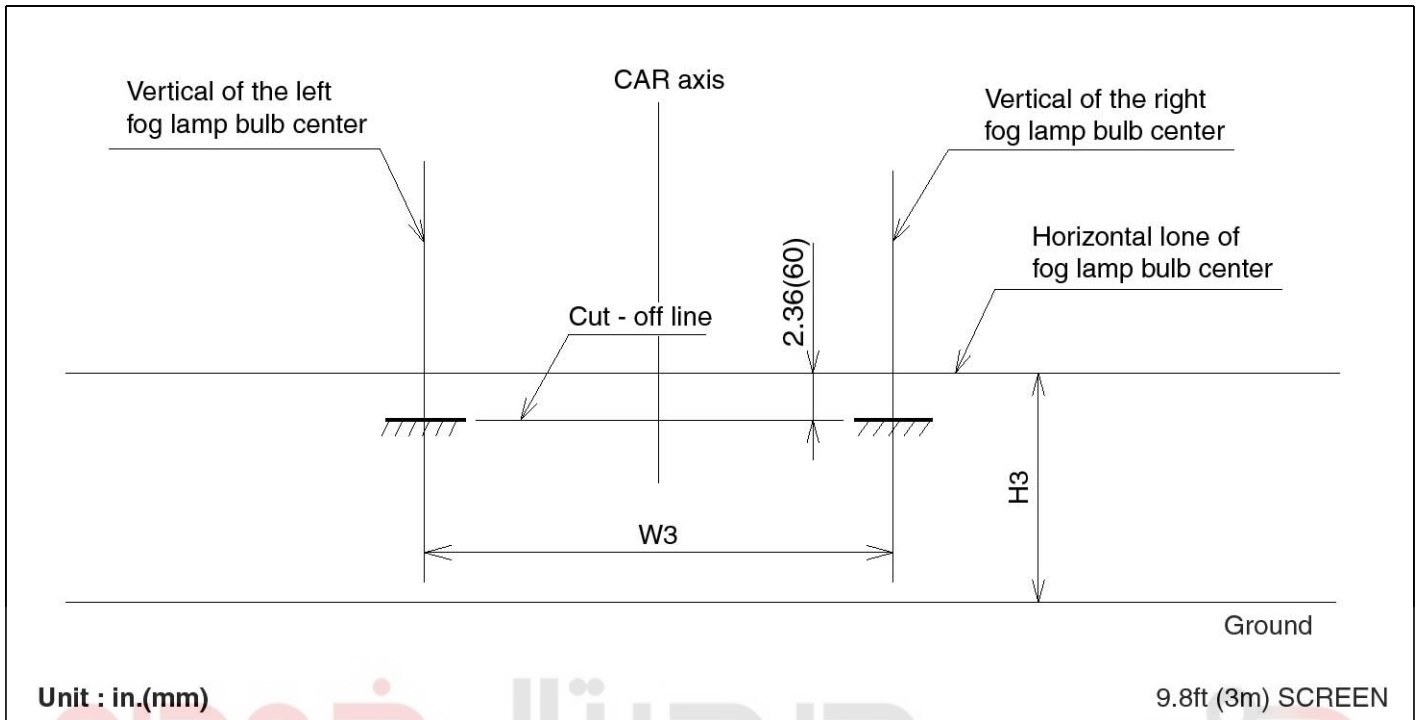
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

# BE-434

# Body Electrical System

2. Turn the front fog lamp on without the driver aboard.

The cut-off line should be projected in the allowable range (shaded region)



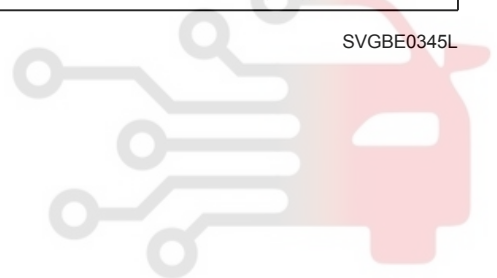
Unit : in.(mm)

9.8ft (3m) SCREEN

SVGBE0345L

دیجیتال خودرو  
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



# Lighting System

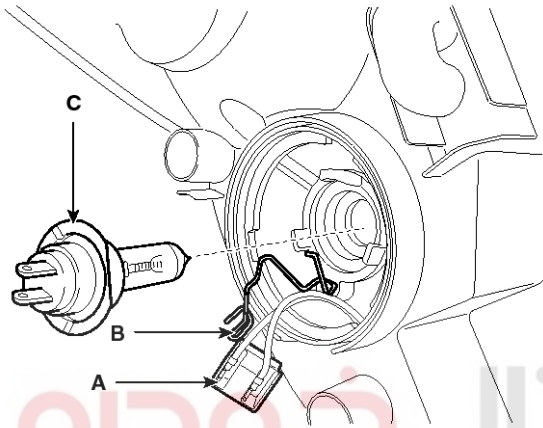
## BE-435

### Replacement

#### Head Lamp (Low)

##### [General type]

1. Turn the head lamp switch off.
2. Disconnect the power connector from the lamp.
3. Remove the head lamp (Low) cap.
4. Disconnect the connector (A).
5. Remove the blub (C) after releasing the fixing clip (B).



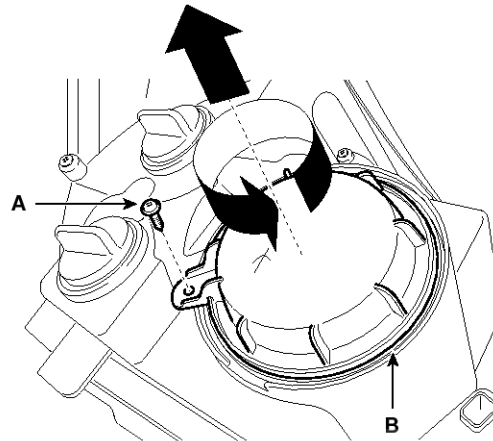
SVGB10121D

6. Installation is the reverse of removal.

### Head Lamp (Low)

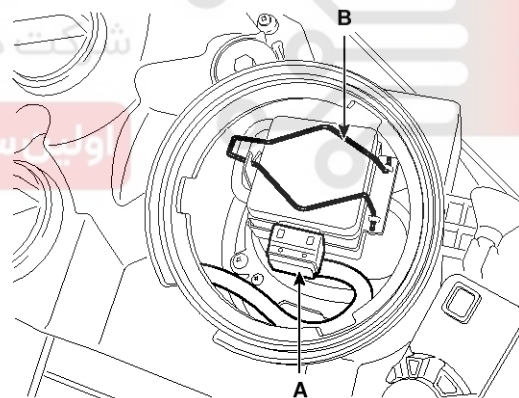
##### [HID type]

1. Turn the head lamp switch off.
2. Disconnect the power connector from the lamp.
3. Remove the head lamp (Low) cap (B) after removing a screw (A).



SVGBE0233D

4. Remove the bulb clip (B) and ignitor connector (A) from the lamp assembly.

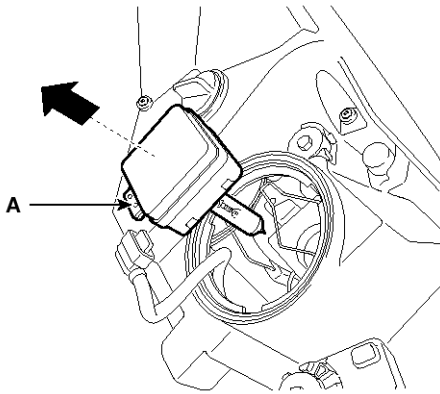


SVGBE0231D

## BE-436

## Body Electrical System

5. Remove the head lamp (Low) ignitor (A).



SVGBE0232D

6. Installation is the reverse of removal.

**CAUTION**

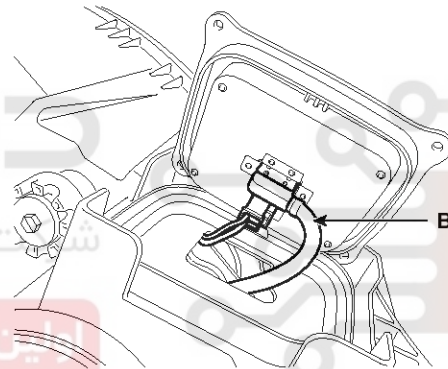
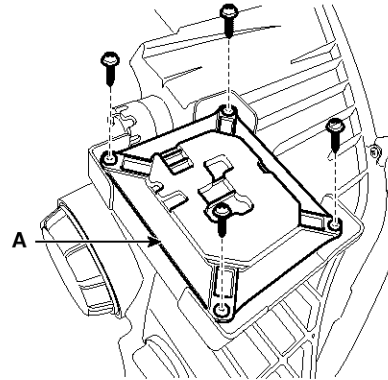
Turn the head lamp switch off to avoid high voltage

Be careful not to damage the bulb and use genuine bulbs only

- Do not apply excessive force and fit it correctly.
- Confirm the bulb locking

**Ballast**

1. Turn the head lamp switch off.
2. Remove the head lamp assembly.
3. Disconnect the power connector from the lamp.
4. Remove the ballast (A) after removing the screws (4EA) and connector (B).



SVGBE0236D

**NOTICE**

Be careful not to be damaged when disconnecting the ballast connector.

# Lighting System

## BE-437

5. Installation is the reverse of removal.

### NOTICE

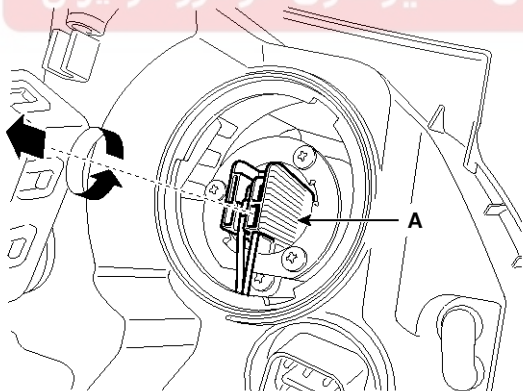
- Turn the head lamp switch off to avoid high voltage.

### CAUTION

- HID lamp shall not be used on other cars.(Fire may occur.)
- Fire may occur when HID lamp initially lights due to the fact that arc-discharge generates high voltage (max. 20,000V) and high current (12-13A), and are different from the halogen lamp specification.
- Install the dust cover after confirming the locking state between bulb and bulb holder.
- When testing the HID head lamp, turn the power on or off with switch between power supply and lamp because of high voltage.
- Do not operate the head lamp switch with the bulb not installed, because it generates spark momentarily.

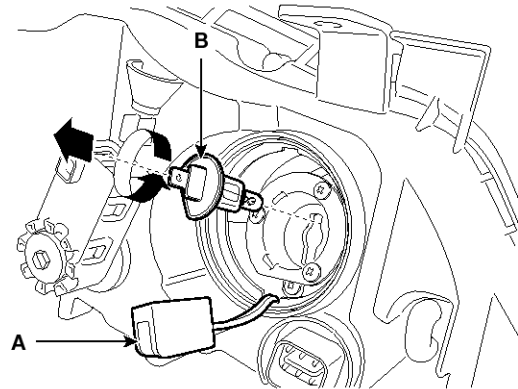
### Head lamp(High) bulb

1. Turn the head lamp power off.
2. Disconnect the power connector from the lamp.
3. Remove the head lamp (High) cap.
4. Turn the bulb connector (A) counterclockwise to remove the bulb socket.



SVGBE0234D

5. Remove the head lamp (High) bulb (B) after removing the connector (A).

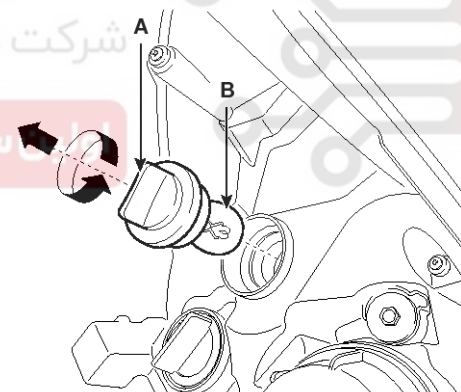


SVGBE0235D

6. Installation is the reverse of removal.

### Turn Signal Lamp

1. Turn the head lamp power off.
2. Remove the lamp assembly.
3. Turn the bulb socket (A) counterclockwise to remove the turn signal bulb (B).



SVGBE0237D

4. Installation is the reverse of removal.

# BE-438

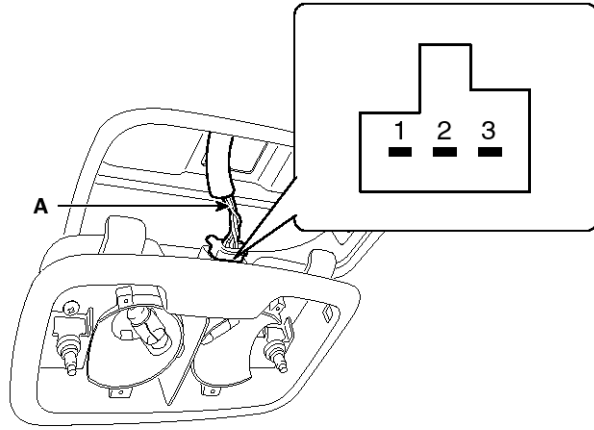
# Body Electrical System

## Room Lamp

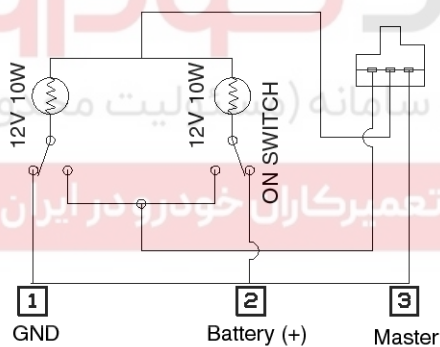
### Inspection

#### Room Lamp

1. Check that the switch operates properly after disconnecting the room lamp connector (A).



SVGBE0245D



SVGBE0346L

| Terminal Position | 1 | 4 |
|-------------------|---|---|
| ON                |   |   |
| OFF               |   |   |

SYFBE0211L

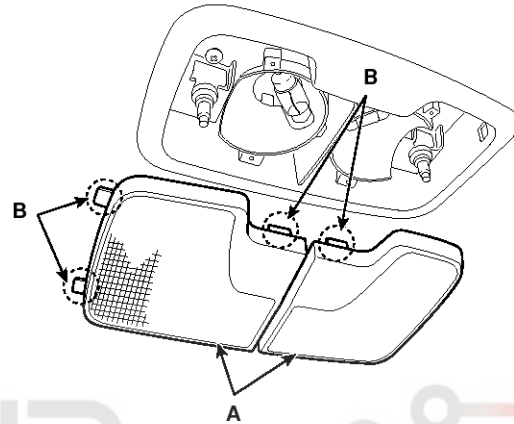
### Removal

#### Room Lamp

1. Disconnect the negative(-) battery terminal.
2. Carefully remove the lens (A) using a small screwdriver.

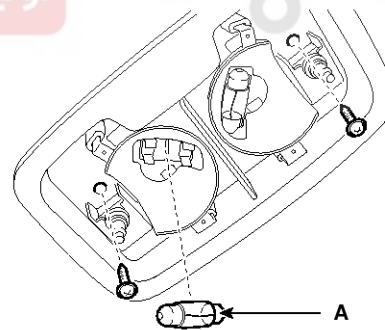
#### CAUTION

Take care not to damage the part (B).



SVGBE0242D

3. Remove the bulb (A) and room lamp after loosening the mounting screws.



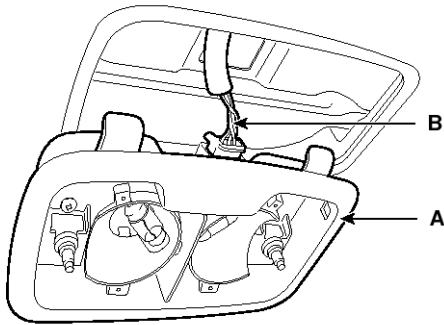
SVGBE0243D



# Lighting System

## BE-439

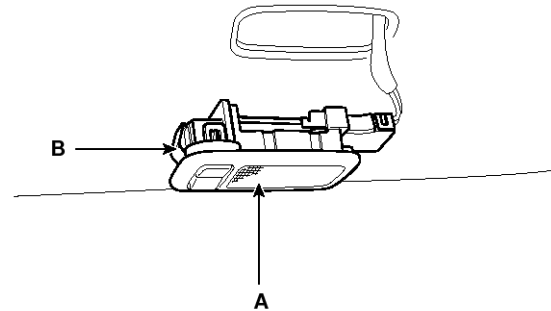
4. Remove the room lamp assembly (A) from the head lining after disconnecting the connector (B).



SVGBE0244D

### Vanity Lamp

1. Disconnect the negative (-) battery terminal.
2. Remove the vanity lamp (A) by pressing the clip (B) with a flat-tip screwdriver.



SVGBE0274D

3. Replace the bulb.

### Installation

#### Room Lamp

1. Reconnect the connector.
2. Install the room lamp assembly.
3. Install the lens.

#### Vanity Lamp

1. Reconnect the vanity lamp connector.
2. Install the vanity lamp.



# BE-440

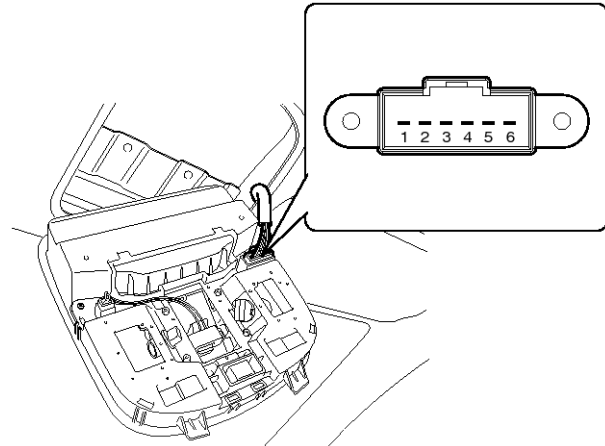
# Body Electrical System

## Overhead Console Lamp

### Inspection

#### Overhead Console Lamp

Remove the overhead console lamp assembly then check for continuity between terminals. If the continuity is not as specified, replace the map lamp switch.

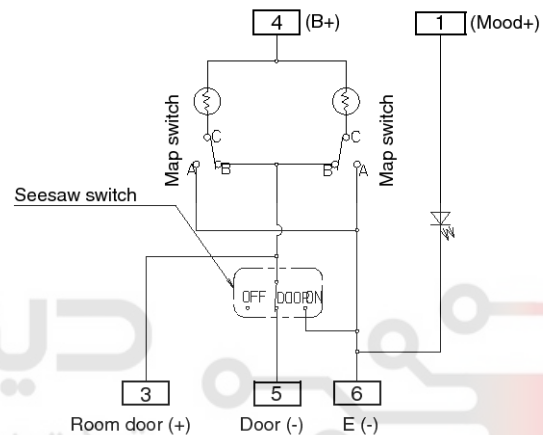


SVGBE0249D

| No. | Description | No. | Description |
|-----|-------------|-----|-------------|
| 1   | Mood (+)    | 4   | Battery (+) |
| 2   | -           | 5   | Door (-)    |
| 3   | Master (+)  | 6   | GND         |

| Terminal | Type     | Map lamp switch |     |       |     |
|----------|----------|-----------------|-----|-------|-----|
|          | Position | Left            |     | Right |     |
|          |          | ON              | OFF | ON    | OFF |
| 6        |          | ○               |     | ○     |     |
| 4        |          | ○               |     | ○     |     |

SVGBE0351L



SVGBE0251D

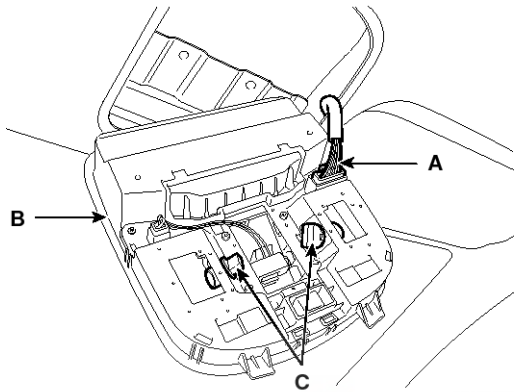
# Lighting System

## BE-441

### Removal

#### Overhead Console Lamp

1. Disconnect the negative (-) battery terminal.
2. Remove the overhead console lamp assembly.  
(Refer to the BD group - "Roof trim")
3. Remove the overhead console lamp (B) after disconnecting the panoramaroof switch connector and lamp connector (A).

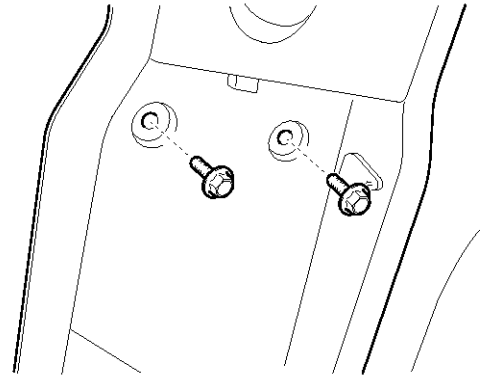


SVGBE0248D

4. If necessary to replace the bulb, replace the bulb (C).

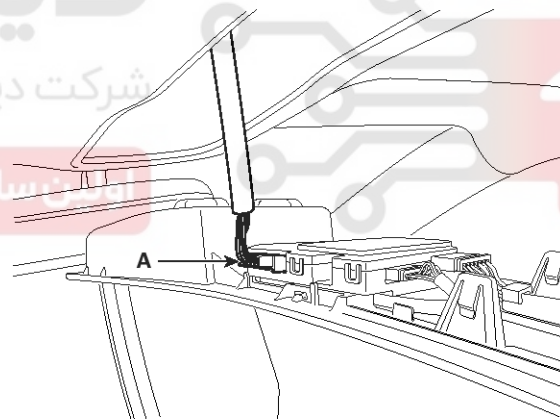
#### Deluxe Overhead Console Lamp

1. Disconnect the negative (-) battery terminal.
2. Open the holder and then remove the bolts (2EA).



SVGB10150D

3. Remove the deluxe overhead console lamp assembly.  
(Refer to the BD group - "Roof trim")
4. Disconnect the connector (A).



SVGBD0162D

### Installation

#### Overhead Console Lamp

1. Install the overhead console lamp after connecting the panoramaroof switch connector and lamp connector.
2. Install the lens after tightening 2 screws.

#### Deluxe Overhead Console Lamp

1. Install the deluxe overhead console lamp assembly after connecting the connector.

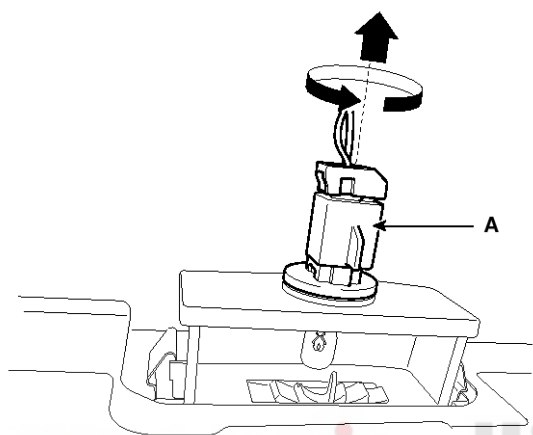
## BE-442

## Body Electrical System

### License Lamp

#### Removal

1. Disconnect the negative(-) battery terminal.
2. Open the trunk and then remove the trunk trim.  
(Refer to the BD group - "Trunk trim")
3. Turn the license bulb socket (A) counterclockwise to remove the bulb.



SVGBE0262D

#### Installation

1. Install the bulb.
2. Install the license lamp lens.



دیجیتال خودرو  
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اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

# Lighting System

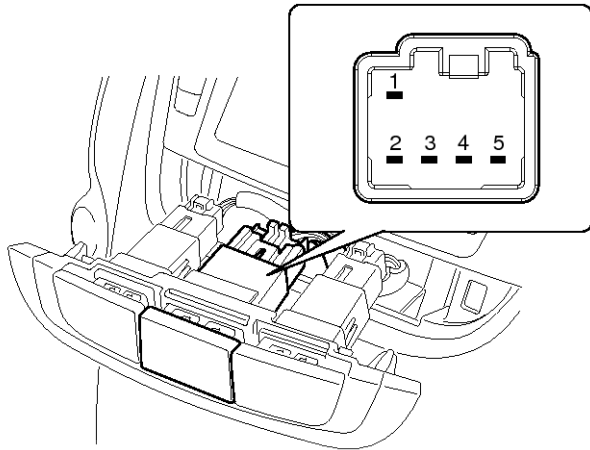
# BE-443

## Hazard Lamp Switch

### Inspection

#### Hazard Lamp Switch

1. Disconnect the switch connector from the center fascia panel.



SVGBE0252D

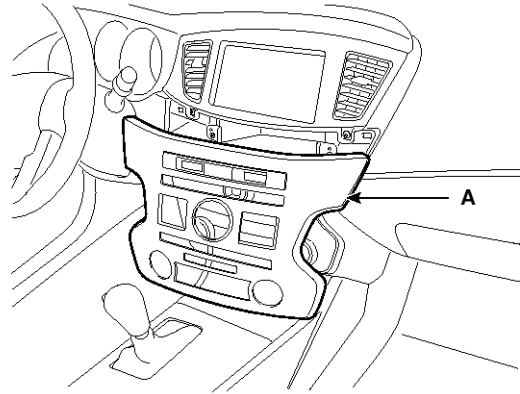
2. Operate the switch and check for continuity between terminals.

| Terminal Position | OFF | ON | Remark  |
|-------------------|-----|----|---------|
| 4                 |     |    | ILL (+) |
| 5                 |     |    | ILL (-) |
| 1                 |     |    | BCM     |
| 2                 |     |    | IGN     |

SVGBE0352L

### Removal

1. Disconnect the negative(-) battery terminal.
2. Remove the center fascia panel (A) with hazard lamp switch.

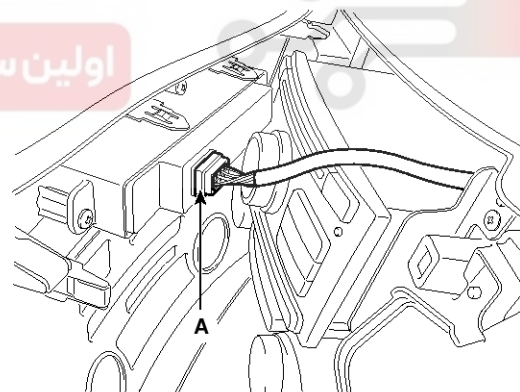


SVGBE0254D

### NOTICE

Apply the protective tapes to the center fascia panel and its related parts.

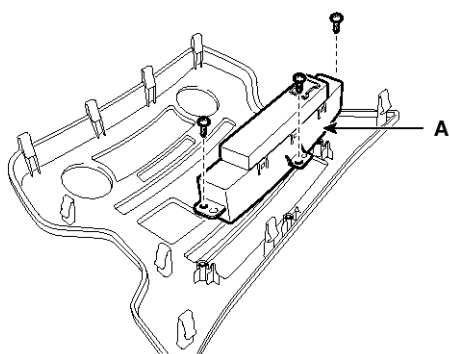
3. Disconnect the hazard lamp switch connector (A).



SVGBE0255D

**BE-444****Body Electrical System**

4. Remove the hazard lamp switch assembly (A) after removing the screws(3EA).



SVGBE0256D

**Installation**

1. Install the hazard lamp switch.
2. Install the center fascia panel.

# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



# Lighting System

# BE-445

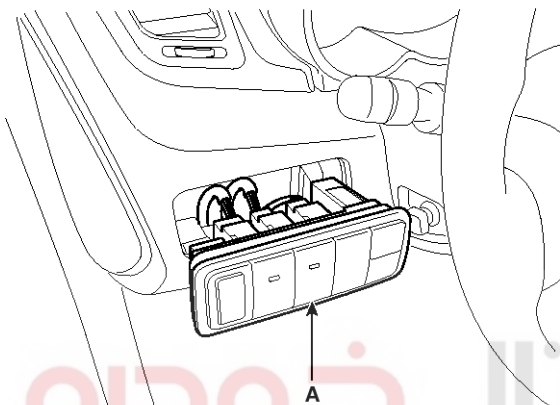
## Rheostat

### Inspection

1. Disconnect the negative (-) battery terminal.
2. Remove the passenger compartment junction box cover.
3. Remove the crash pad side switch assembly (A) by pushing it through junction box cover hole.

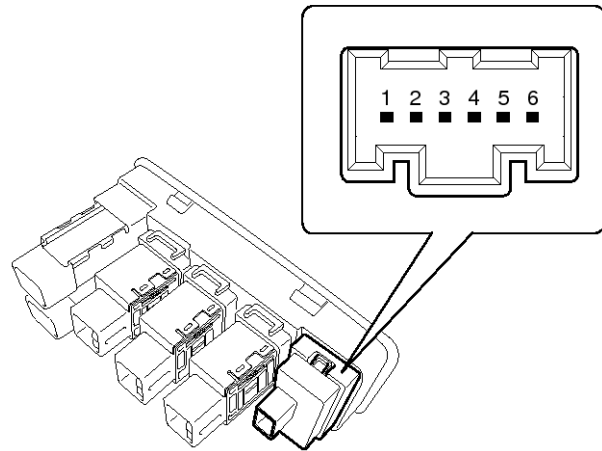
**NOTICE**

Put on gloves to protect your hands.



SVGBE0178D

4. Disconnect the rheostat connector (A) from lower crash pad switch.



SVGBE0258D

5. Operate the rheostat switch and check for continuity between terminals.

| Terminal Position | Up | Down | Remark  |
|-------------------|----|------|---------|
| 1                 |    | ○    | Down    |
| 2                 | ○  | ○    | GND     |
| 5                 | ○  |      | Up      |
| 3                 | ○  | ○    | ILL (-) |
| 4                 | ○  | ○    | ILL (+) |

SVGBE0347L



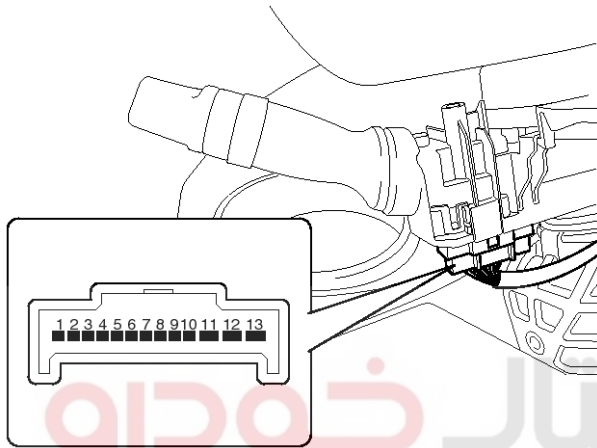
# BE-446

# Body Electrical System

## Front Fog Lamps

### Inspection

1. Disconnect the negative(-) battery terminal.
2. Remove the lighting switch of the multi-function switch. (Refer to the multi-function switch)
3. With the front fog lamp switch, make sure that continuity exists between the terminals below.  
If continuity is not as specified, replace the multi-function switch.



SVGB10078D

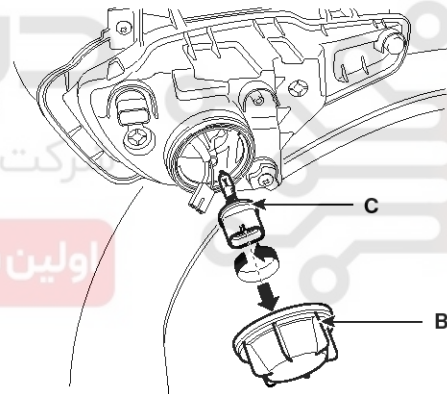
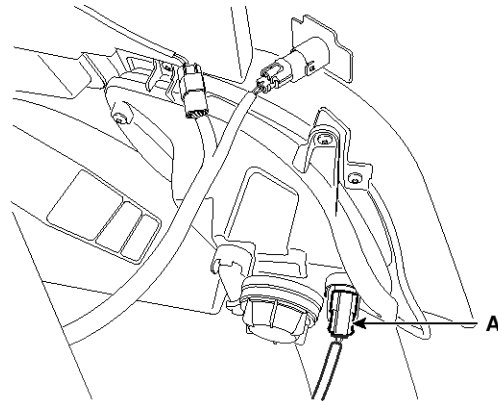
### Front Fog Lamp

|                      |         |         |
|----------------------|---------|---------|
| Terminal<br>Position | 5       | 6       |
| OFF                  |         |         |
| ON                   | ○ ——— ○ | ○ ——— ○ |

SBKBE9118L

### Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the front wheel housing.  
(Refer to the BD group - "Front bumper")
3. Disconnect the front fog lamp connector (A) and remove the cover (B).

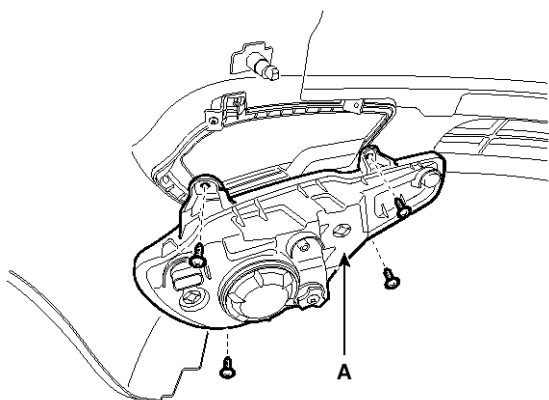


SVGBE0260D

## Lighting System

## BE-447

4. Replace the front fog bulb (C) turning it in the counterclockwise direction.
5. Remove the front fog lamp (A) after removing the screws (4EA).



SVGBE0261D

### Installation

1. Install the front fog bulb.
2. Reconnect the lamp connector.
3. Install the front wheel housing.

# دیجیتال خودرو

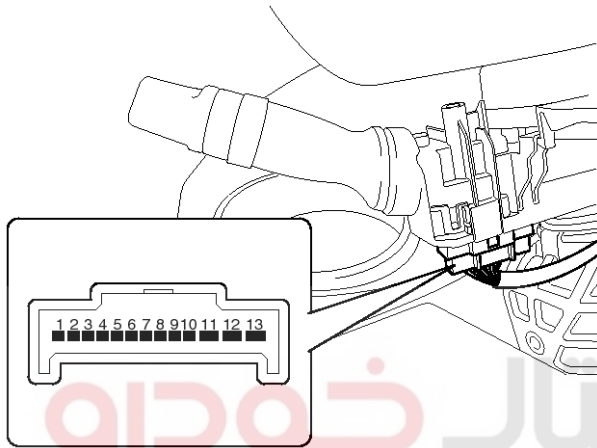
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



**BE-448****Body Electrical System****Rear Fog Lamps****Inspection**

1. Disconnect the negative(-) battery terminal.
2. Remove the lighting switch of the multi-function switch. (Refer to the multi-function switch)
3. With the rear fog lamp switch, make sure that continuity exists between the terminals below.  
If continuity is not as specified, replace the multi-function switch.



SVGB10078D

**Rear Fog Lamp**

| Terminal<br>Position | 5 | 6 | 7 |
|----------------------|---|---|---|
| OFF                  |   |   |   |
| Front                | ○ | ○ |   |
| Rear                 | ○ |   | ○ |
| Front & Rear         | ○ | ○ | ○ |

SVGBE0348L



شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

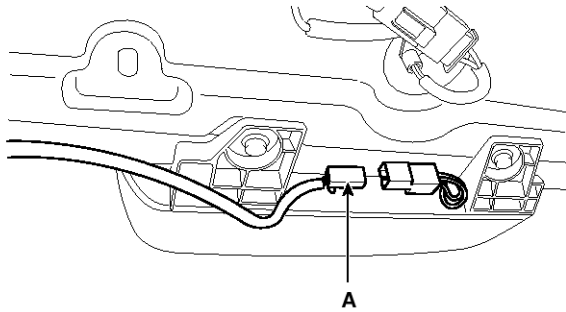
# Lighting System

## BE-449

### High Mounted stop lamp

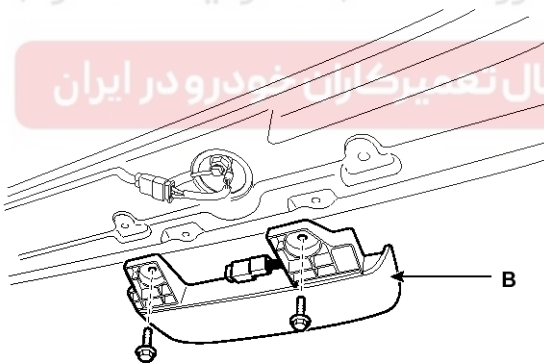
#### Removal

1. Disconnect the negative(-) battery terminal.
2. Remove the roof trim.  
(Refer to the BD group - "Roof trim")
3. Disconnect the connector of high mounted stop lamp.



SVGBE0264D

4. Remove the high mounted stop lamp (B) after removing the bolts (2EA).



SVGB10122D

#### Installation

1. Install the high mounted stop lamp to the roof trim.
2. Install the roof trim.



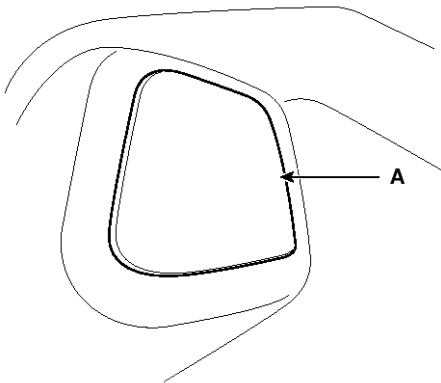
# BE-450

# Body Electrical System

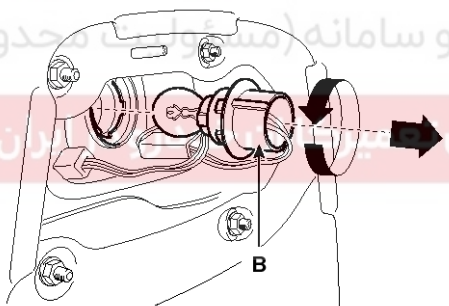
## Rear Combination Lamp

### Rear Combination Lamp (Outside)

1. Disconnect the negative (-) battery terminal.
2. If the bulbs should be only replaced without removing lamp assembly, replace the turn signal lamp bulb (B) after removing the trim cover (A) in the trunk.

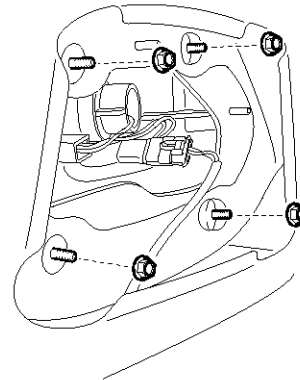


SVGBE0266D



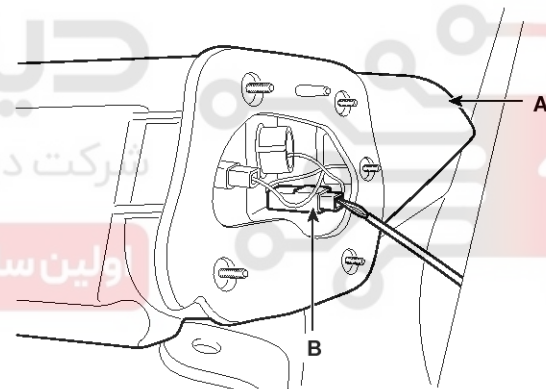
SVGBE0267D

3. Remove the nuts (4EA).



SVGBE0268D

4. Remove the rear combination lamp (A) after disconnecting the connector (B).

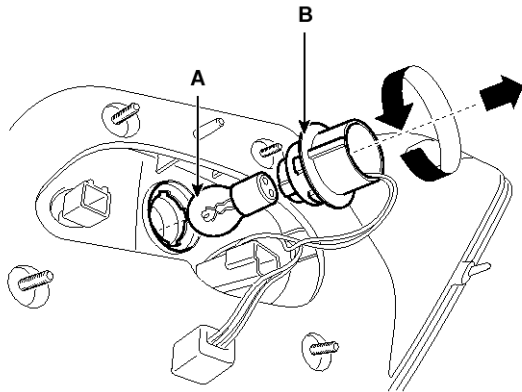


SVGBE0269D

# Lighting System

# BE-451

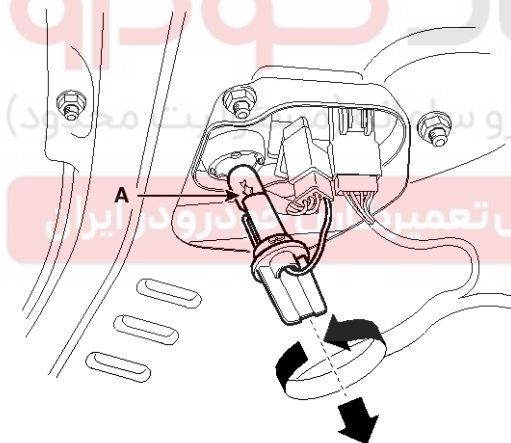
5. Turn the socket counterclockwise to remove the turn signal lamp bulb (A).



SVGBE0270D

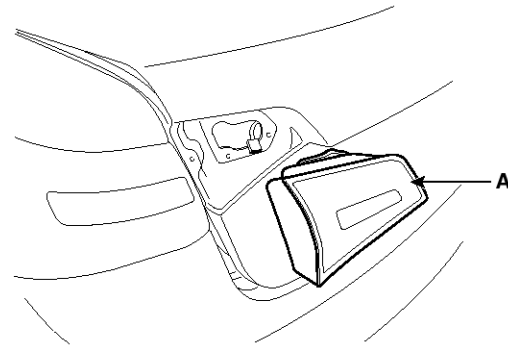
## Rear Combination Lamp (Inside)

1. Disconnect the negative (-) battery terminal.
2. If the bulbs should be only replaced without removing lamp assembly, replace the back up lamp bulb (A) after removing the trim cover in the trunk.



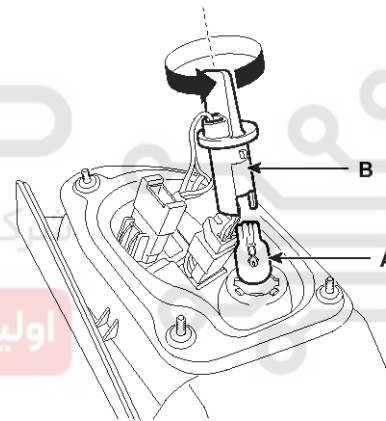
SVGBE0271D

3. Remove the rear combination lamp (A) after removing the connector and nuts (3EA).



SVGBE0365D

4. Turn the socket counterclockwise to remove the back up lamp bulb (A).



SVGBE0273D

## Installation

1. Install the rear combination lamp assembly after assembling the bulb.
2. Install the lamp cover to the tailgate after connecting the lamp connector.

## BE-452

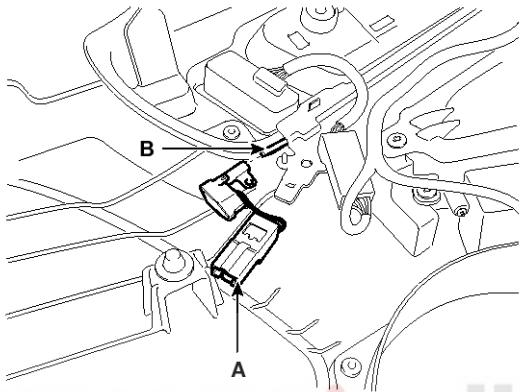
## Body Electrical System

## Door Lamp

## Removal

## Mood Lamp

1. Disconnect the negative (-) battery terminal.
2. Remove the front door trim.  
(Refer to BD group - "Front door")
3. Remove the connector and LED mood lamp (A).

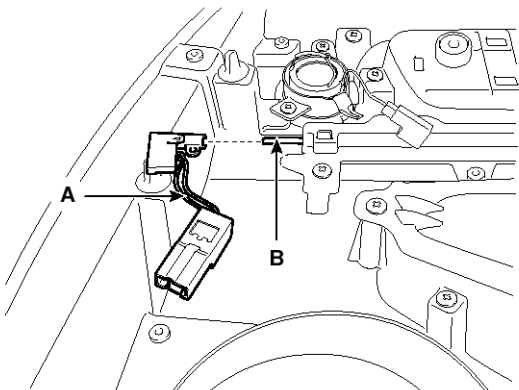


SVGBE0275D

**NOTICE**

Take care not to damage the reflector (B) when removing the LED mood lamp.

4. Remove the rear door trim. (Refer to BD group - "Rear door")
5. Remove the connector and LED mood lamp (A).



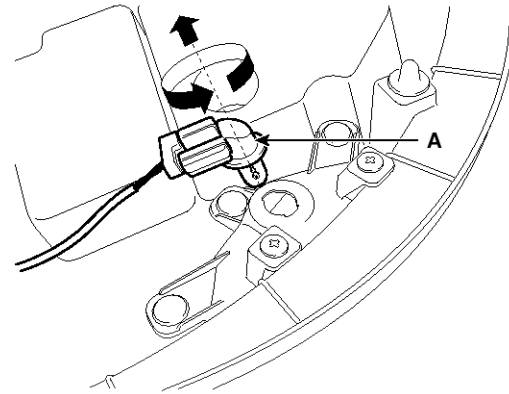
SVGBE0276D

**NOTICE**

Take care not to damage the reflector (B) when removing the LED mood lamp.

## Door Lamp

1. Disconnect the negative (-) battery terminal.
2. Remove the front door trim.  
(Refer to BD group - "Front door")
3. Turn the socket counterclockwise to remove the door lamp bulb (A).



SVGBE0277D

## Installation

## Mood Lamp

1. Install the door mood lamp after connecting the connector.
2. Install the door trim.
3. Connect the negative (-) battery terminal.

## Door Lamp

1. Install the door lamp after connecting the connector.
2. Install the door trim.
3. Connect the negative (-) battery terminal.



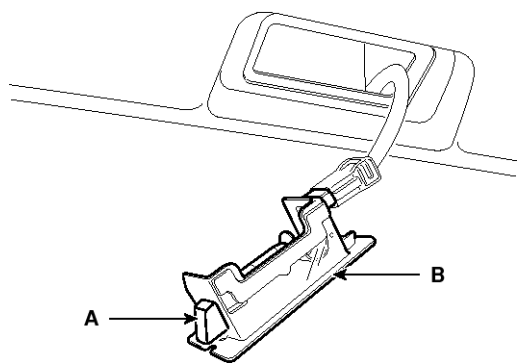
# Lighting System

## BE-453

### Trunk Lamps

#### Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the luggage room lamp (B) when prying the hole (A) with a flat-up screwdriver.



SVGBE0265D

3. Remove the luggage room lamp bulb in case of necessity.

#### Installation

1. Install the luggage room lamp assembly after connecting the lamp connector.



## BE-454

## Body Electrical System

## Troubleshooting

1. The lamp switch inputs can be checked using the GDS.
2. To check the input value of lamp switch, select option "IPM".

3. To consult the present input/output value of IPM, "Current DATA". It provides information of IPM input/output conditions of power supply, turn signal/brake lamp, headlamp, door, locks, outside mirror, wiper, auto-light and transmitters etc.

| Current Data                                       |       |      |
|----------------------------------------------------|-------|------|
| Sensor Name                                        | Value | Unit |
| <input type="checkbox"/> Parking brake switch      | PARK  | -    |
| <input type="checkbox"/> DRL option Line           | NONE  | -    |
| <input type="checkbox"/> HID option line           | NONE  | -    |
| <input type="checkbox"/> Rain sensor option line   | RAIN  | -    |
| <input type="checkbox"/> NAS Option Line           | OFF   | -    |
| <input type="checkbox"/> Tail Lamp LH Output       | OFF   | -    |
| <input type="checkbox"/> Tail Lamp RH Output       | OFF   | -    |
| <input type="checkbox"/> Tail lamp interior output | OFF   | -    |
| <input type="checkbox"/> Head lamp low LH output   | OFF   | -    |
| <input type="checkbox"/> Head lamp low RH output   | OFF   | -    |
| <input type="checkbox"/> Head Lamp High LH Output  | OFF   | -    |
| <input type="checkbox"/> Head Lamp High RH Output  | OFF   | -    |
| <input type="checkbox"/> Front Fog Output          | OFF   | -    |
| <input type="checkbox"/> Rear fog relay            | OFF   | -    |
| <input type="checkbox"/> Defogger / Deicer Relay   | OFF   | -    |
| <input type="checkbox"/> Burglar horn relay        | OFF   | -    |
| <input type="checkbox"/> Horn relay                | OFF   | -    |
| <input type="checkbox"/> Trunk release relay       | OFF   | -    |
| <input type="checkbox"/> Int Volume                | 2.25  | V    |
| <input type="checkbox"/> Auto light sensor         | 1.00  | V    |
| <input type="checkbox"/> Interior Mood lamp output | OFF   | -    |

SVGBE0401L

# Lighting System

## BE-455

4. To check the input value of lamp switch in force mode, select option "Actuation Test of smart junction box".

Actuation Test
☰

| Test Item                                       |  |
|-------------------------------------------------|--|
| Turn LH Output                                  |  |
| Turn RH Output                                  |  |
| Front Fog Lamp                                  |  |
| Rear fog lamp relay                             |  |
| External Buzzer Output                          |  |
| Defogger / Deicer Relay                         |  |
| Room lamp                                       |  |
| Ignition key hole illumination(Manual Key Type) |  |
| Security LED Output                             |  |
| Assist seat belt indicator                      |  |
| Manual HLLD Signal Output                       |  |
| Auto light power                                |  |
| AV Tail                                         |  |
| Key Interlock Solenoid(Manual Key Type)         |  |
| Interior Mood Lamp Output                       |  |

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

Start

Stop

SVGBE0405L

| Symptom                                   | Possible cause                          | Remedy                           |
|-------------------------------------------|-----------------------------------------|----------------------------------|
| One lamp does not light<br>(all exterior) | Bulb burned out                         | Replace bulb                     |
|                                           | Socket, wiring or ground faulty         | Repair if necessary              |
| Head lamps do not light                   | Bulb burned out                         | Replace bulb                     |
|                                           | Ignition fuse (LOW:10A, HIGH:20A) blown | Check for short and replace fuse |
|                                           | Head lamp fuse (15A) blown              | Check for short and replace fuse |
|                                           | Head lamp relay faulty                  | Check relay                      |
|                                           | Lighting switch faulty                  | Check switch                     |
|                                           | Wiring or ground faulty                 | Repair if necessary              |

## BE-456

## Body Electrical System

| Symptom                                          | Possible cause                                       | Remedy                           |
|--------------------------------------------------|------------------------------------------------------|----------------------------------|
| Tail lamps and license plate lamps do not light  | Bulb burned out                                      | Replace bulb                     |
|                                                  | Tail lamp fuse (10A) blown                           | Check for short and replace fuse |
|                                                  | Tail lamp relay faulty                               | Check relay                      |
|                                                  | Lighting switch faulty                               | Check switch                     |
|                                                  | Wiring or ground faulty                              | Repair if necessary              |
| Stop lamps do not light                          | Bulb burned out                                      | Replace bulb                     |
|                                                  | Stop lamp fuse (15A) blown                           | Check for short and replace fuse |
|                                                  | Stop lamp switch faulty                              | Adjust or replace switch         |
|                                                  | Wiring or ground faulty                              | Repair if necessary              |
| Stop lamps do not turn off                       | Stop lamp switch faulty                              | Repair or replace switch         |
| Instrument lamps do not light (Tail lamps light) | Rheostat faulty                                      | Check rheostat                   |
|                                                  | Wiring or ground faulty                              | Repair if necessary              |
| Turn signal lamp does not flash on one side      | Bulb burned out                                      | Replace bulb                     |
|                                                  | Turn signal switch faulty                            | Check switch                     |
|                                                  | Wiring or ground faulty                              | Repair if necessary              |
| Turn signal lamps do not light                   | Bulb burned out                                      | Replace bulb                     |
|                                                  | Turn signal lamp fuse (10A) blown                    | Check for short and replace fuse |
|                                                  | Flasher unit faulty                                  | Check flasher unit               |
|                                                  | Turn signal switch faulty                            | Check switch                     |
|                                                  | Wiring or ground faulty                              | Repair if necessary              |
| Hazard warning lamps do not light                | Bulb burned out                                      | Replace bulb                     |
|                                                  | Hazard warning lamp fuse (15A) blown                 | Check for short and replace fuse |
|                                                  | Flasher unit faulty                                  | Check flasher unit               |
|                                                  | Hazard switch faulty                                 | Check switch                     |
|                                                  | Wiring or ground faulty                              | Repair if necessary              |
| Flasher rate too slow or too fast                | Lamps' wattages are smaller or larger than specified | Replace lamps                    |
|                                                  | IPM faulty                                           | Check IPM                        |
| Back up lamps do not light                       | Bulb burned out                                      | Replace bulb                     |
|                                                  | Back up lamp fuse (10A) blown                        | Check for short and replace fuse |
|                                                  | Back up lamp switch (M/T) faulty                     | Check switch                     |
|                                                  | Transaxle range switch (A/T) faulty                  | Check switch                     |
|                                                  | Wiring or ground faulty                              | Repair if necessary              |

# Lighting System

## BE-457

| Symptom                      | Possible cause                  | Remedy                           |
|------------------------------|---------------------------------|----------------------------------|
| Room lamp does not light     | Bulb burned out                 | Replace bulb                     |
|                              | Room lamp fuse (10A) blown      | Check for short and replace fuse |
|                              | Room lamp switch faulty         | Check switch                     |
|                              | Wiring or ground faulty         | Repair if necessary              |
| Front fog lamps do not light | Bulb burned out                 | Replace bulb                     |
|                              | Front fog lamp fuse (15A) blown | Check for short and replace fuse |
|                              | Front fog lamp relay faulty     | Check relay                      |
|                              | Front fog lamp switch faulty    | Check switch                     |
|                              | Wiring or ground faulty         | Repair if necessary              |
| Rear fog lamps do not light  | Rear fog lamp fuse (15A) blown  | Check for short and replace fuse |
|                              | Rear fog lamp fuse (15A) blown  | Check for short and replace fuse |
|                              | Rear fog lamp switch faulty     | Check switch                     |
|                              | Rear fog lamp relay faulty      | Check relay                      |
| Wiring or ground faulty      | Repair if necessary             |                                  |
| Map lamp does not light      | Bulb burned out                 | Replace bulb                     |
|                              | Room lamp fuse (10A) blown      | Check for short and replace fuse |
|                              | Map lamp switch faulty          | Check switch                     |
|                              | Wiring or ground faulty         | Repair if necessary              |
| Trunk lamp does not light    | Bulb burned out                 | Replace bulb                     |
|                              | Room lamp fuse (10A) blown      | Check for short and replace fuse |
|                              | Wiring or ground faulty         | Repair if necessary              |

# BE-458

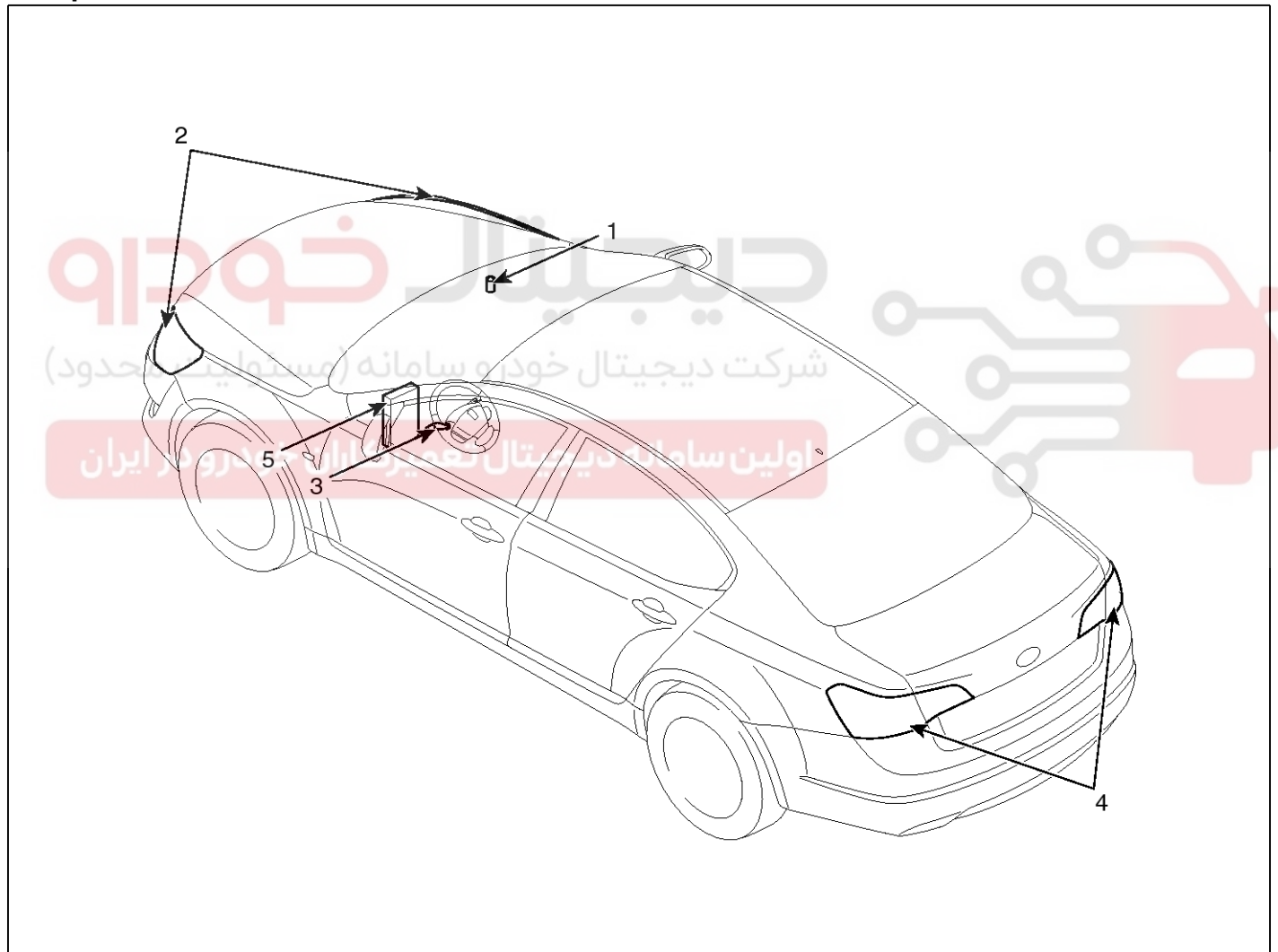
# Body Electrical System

## Auto Lighting Control System

### Specifications

| Items         |           | Specifications                     |
|---------------|-----------|------------------------------------|
| Rated voltage |           | DC +5V                             |
| Load          |           | Max. 1mA (When head lamp lighting) |
| Illuminations | Tail lamp | ON : $0.52 \pm 0.03$ (V)           |
|               |           | OFF : $1.58 \pm 0.05$ (V)          |
|               | Head lamp | ON : $0.52 \pm 0.03$ (V)           |
|               |           | OFF : $1.58 \pm 0.05$ (V)          |

### Component Location



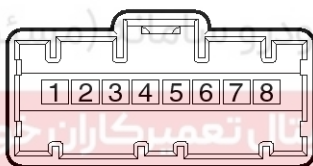
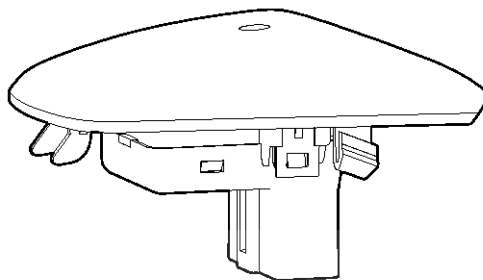
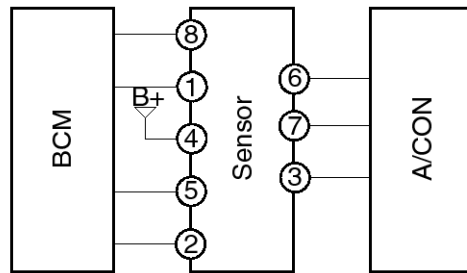
SVGBE0210D

- 1. Auto light sensor
- 2. Head lamps
- 3. Lighting switch (Auto)
- 4. Tail lamps
- 5. IPM (Intelligent intergrated Platform Module)

# Auto Lighting Control System

# BE-459

## Circuit Diagram



[Auto Light Sensor Connector]

| No. | Description           |
|-----|-----------------------|
| 1   | Auto light signal     |
| 2   | Auto light GND        |
| 3   | Photo signal (RH)     |
| 4   | LED power (B+)        |
| 5   | LED GND (To IPM)      |
| 6   | Photo signal (LH)     |
| 7   | Photo power (SW)      |
| 8   | Auto light power (5V) |

SVGBE0353L



# BE-460

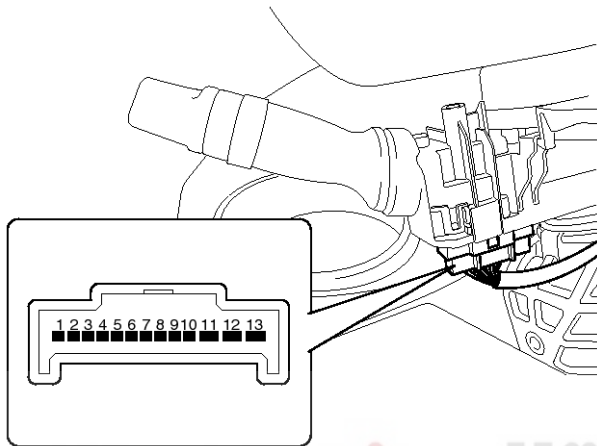
# Body Electrical System

## Auto Light Switch

### Inspection

#### Lighting Switch Inspection

With the multi function switch in each position, make sure that continuity exists between the terminals below. If continuity is not as specified, replace the multi-function switch.



SVGB10078D

### Lighting Switch (Auto Light)

| Terminal Position | 1 | 2 | 4 | 3 |
|-------------------|---|---|---|---|
| OFF               |   |   |   |   |
| Tail              | ○ | ○ |   |   |
| H/Lamp            | ○ | ○ | ○ |   |
| AUTO              |   | ○ |   | ○ |

SVGBE0354L

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



# Auto Lighting Control System

## BE-461

### Auto Light Sensor

#### Inspection

In the state of IGN1 ON, when multi function switch module detects auto light switch on, tail lamp relay output and head lamp low relay output are controlled according to auto light sensor's input.

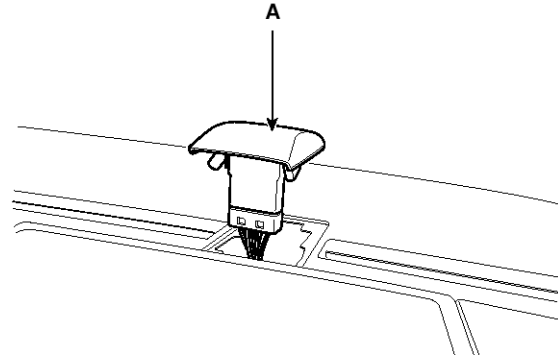
The auto light control doesn't work if the pin sunlight supply (5V regulated power from Ignition 1 power to sunlight sensor) is in short circuit with the ground.

If IGN1 ON, The BCM monitors the range of this supply and raises up a failure as soon as the supply's voltage is out of range. Then this failure occurs and as long as this is present, the head lamp must be turned on without taking care about the sunlight level provided by the sensor.

This is designed to prevent any head lamp cut off when the failure occurs during the night.

#### Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the auto light sensor (A) from crash pad upper side by using screw (-) driver.

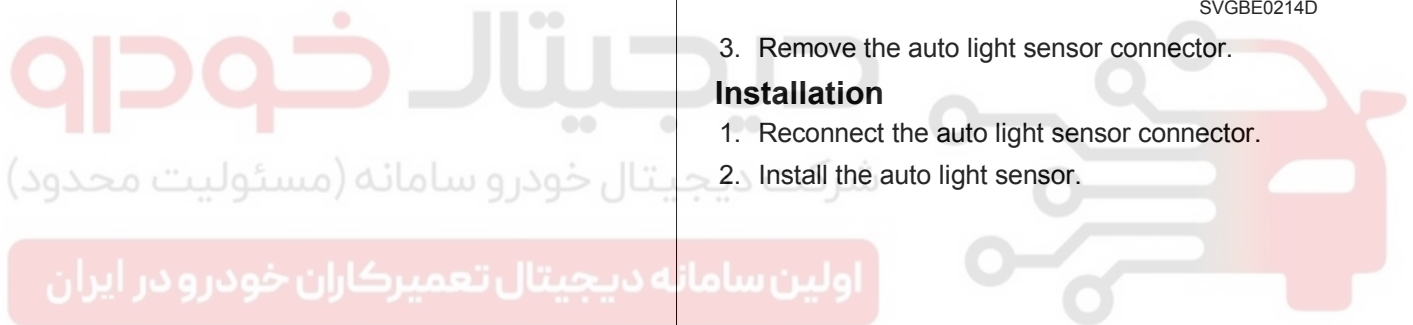


SVGBE0214D

3. Remove the auto light sensor connector.

#### Installation

1. Reconnect the auto light sensor connector.
2. Install the auto light sensor.

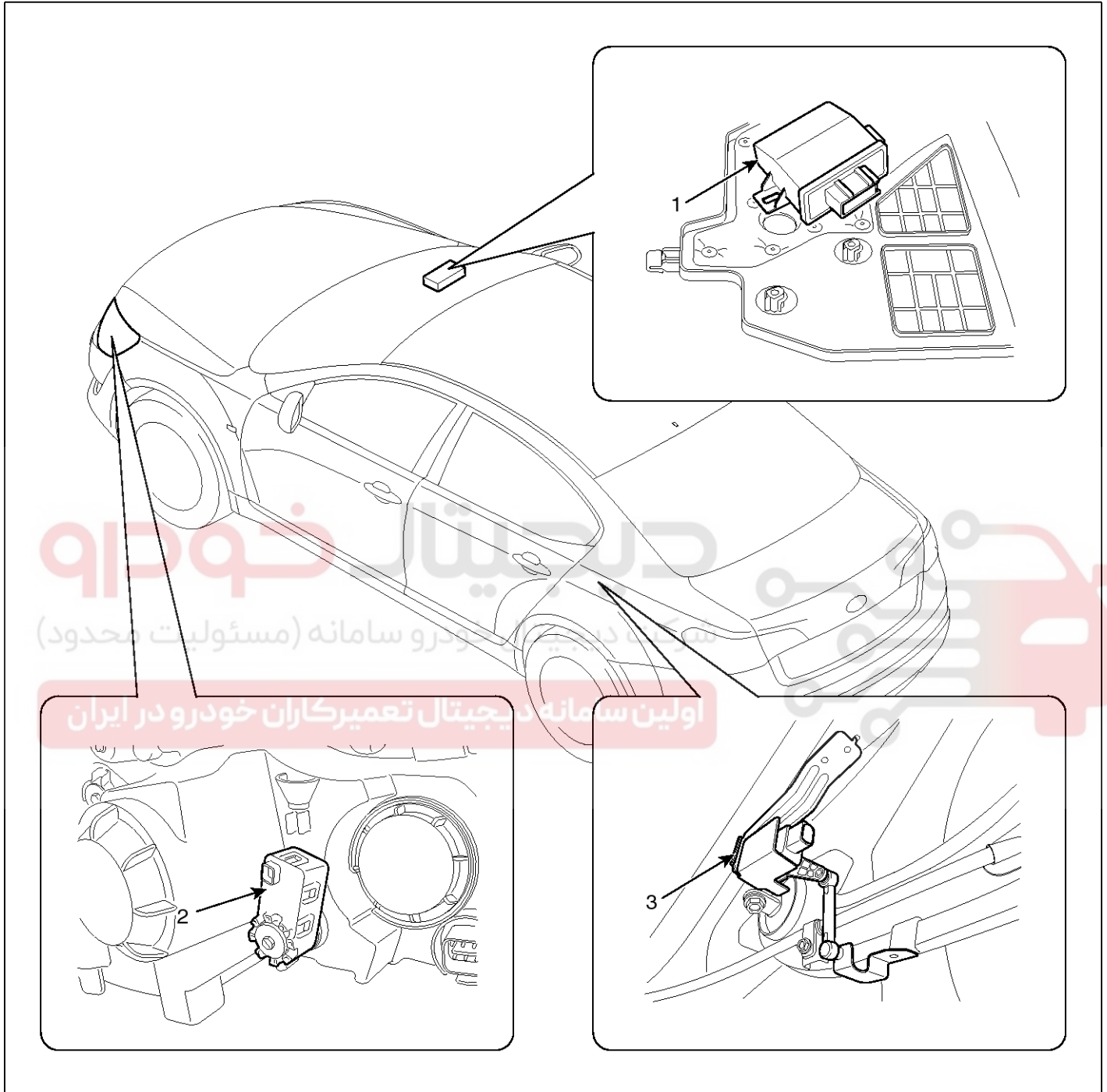


# BE-462

# Body Electrical System

## Head lamp leveling Device

### Component Location



SVGBE0116D

- 1. Head lamp leveling unit
- 2. Head lamp leveling actuator

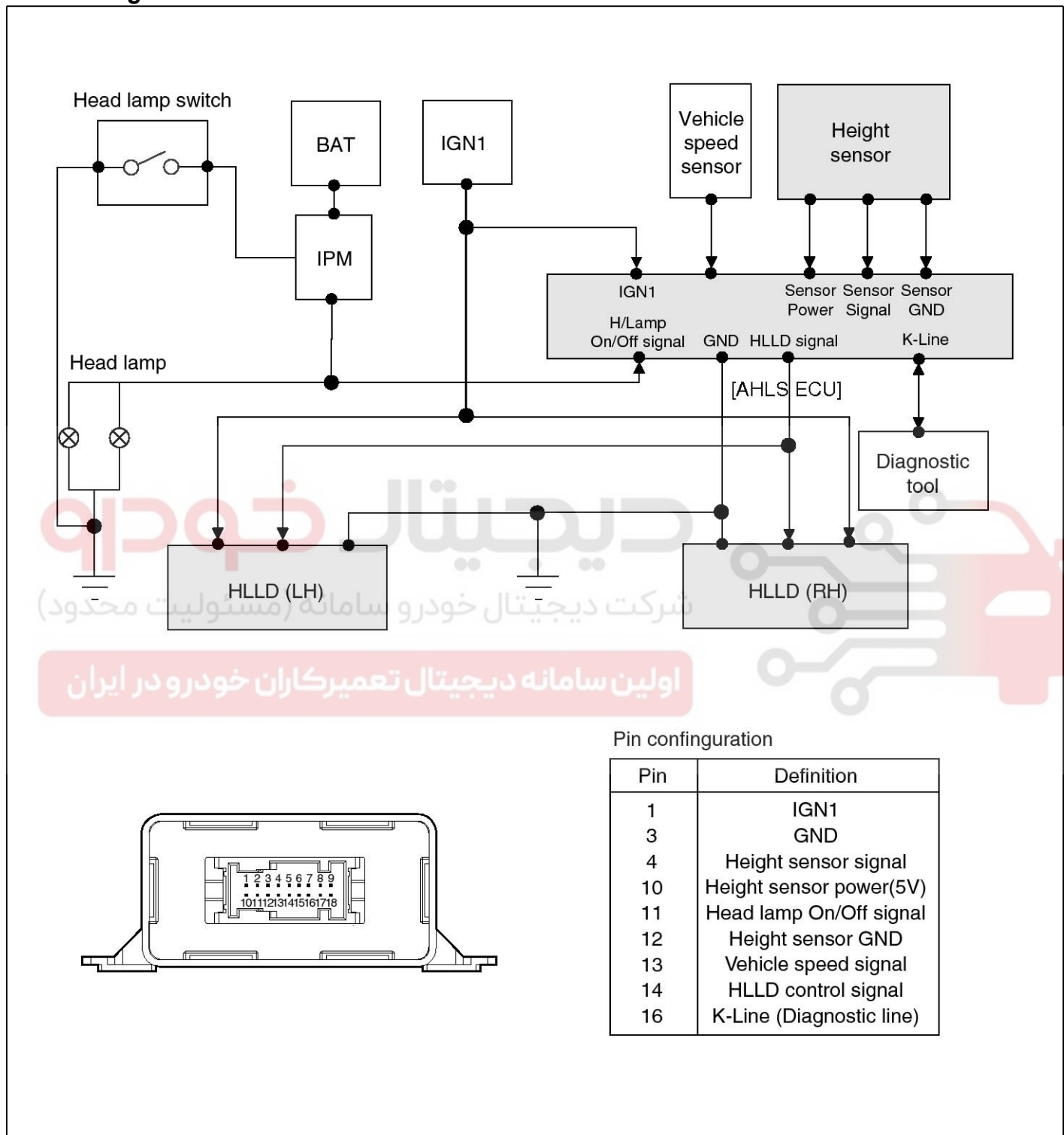
- 3. Head lamp leveling sensor

# Head lamp leveling Device

BE-463

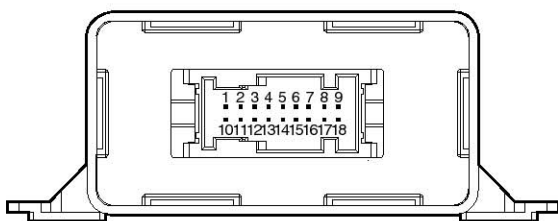
## Auto Head lamp leveling Unit

### Circuit Diagram



Pin configuration

| Pin | Definition               |
|-----|--------------------------|
| 1   | IGN1                     |
| 3   | GND                      |
| 4   | Height sensor signal     |
| 10  | Height sensor power(5V)  |
| 11  | Head lamp On/Off signal  |
| 12  | Height sensor GND        |
| 13  | Vehicle speed signal     |
| 14  | HLLD control signal      |
| 16  | K-Line (Diagnostic line) |



SVGBE0355L

# BE-464

# Body Electrical System

## Description

According to driving environment and loading state of vehicle, head lamp lighting direction is changed to keep the driver's visibility range and to protect the driver's vision from glare, aiming at safety driving.

Sensor mounting on the rear center arm drives the actuator mounting on the head lamp since sensing the input signal following the vehicle's static changes.

Head lamp beam is automatically operated by chassis tilt.

## Purpose of AHLS(Auto Headlamp Leveling System)

- Compensation of headlamp visual range for changes in vehicle load.
- Preventing oncoming traffic being blinded by excessive glare.
- Meeting regulation

## Operation

### Operating Procedure

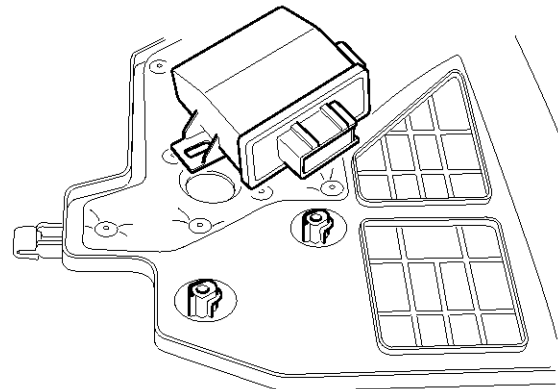
1. Suspension angle change resulted from vehicle's load change.
2. Height sensor signal change
3. Calculation of HLLD signal by AHLS ECU algorithm.
4. Sending a proper signal to HLLD (head lamp levelling device) and driving actuator.
5. Actuation of HLLD and compensation of headlamp beam range.

### Operating Condition

- IGN1 ON & Head lamp low beam ON
- Sensor angle changed over 1° and keeping 10~12seconds with vehicle standing.
- Sensor angle changed over 1° and keeping 10~12seconds and when vehicle runs over 20km/h with constant speed.
- Leveling control is off after controlling HLLD for few seconds.
- To eliminate mechanical tolerance, the lamp position is always reached from the lower side.

## System characteristics

1. AHLS (auto head lamp leveling system) unit.

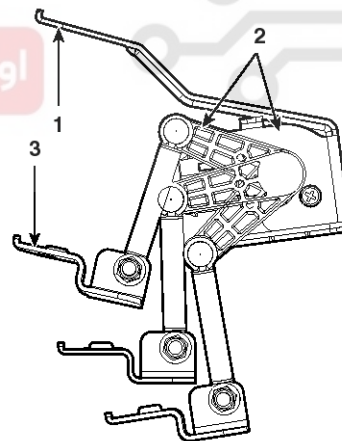


SVGB10123D

- Calculation of HLLD signal by AHLS ECU algorithm.

2. Height sensor and link.

| No. | Components              |
|-----|-------------------------|
| 1   | Sensor mounting bracket |
| 2   | Height sensor and link  |
| 3   | Link bracket            |



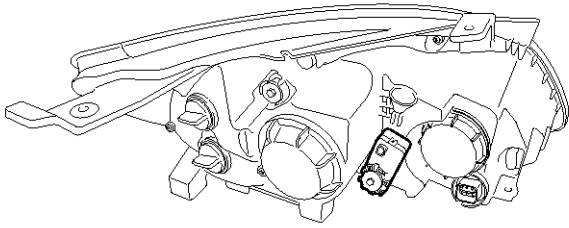
SVGBE0204D

- Using a Micro-processor, percept the operation lever's mechanical angle change or speed signal.
- As an actuator control device of inner control program, mounting on the rear center arm.

# Head lamp leveling Device

## BE-465

3. HLLD (head lamp leveling device) actuator.



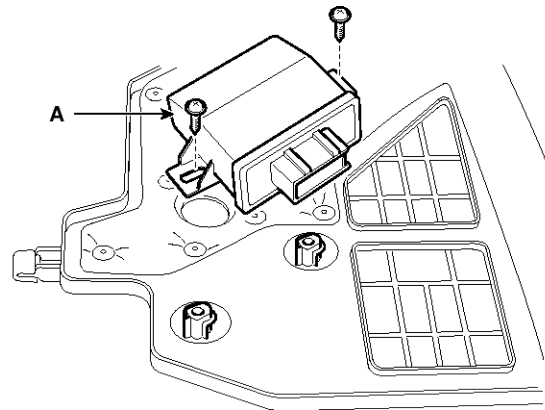
SVGB10124D

- Change the head lamp lighting direction up or down since automatic head lamp levelling unit sensing the input signal following the vehicle's static changes.

### Removal

#### AHLS Unit

1. Disconnect the negative(-) battery terminal.
2. Remove the passenger's under cover.  
(Refer to BD group - "Crash pad")
3. Remove the AHLS unit (A) after loosening the screws and connector.

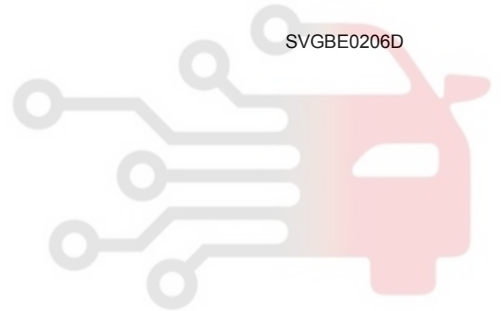


SVGBE0206D

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

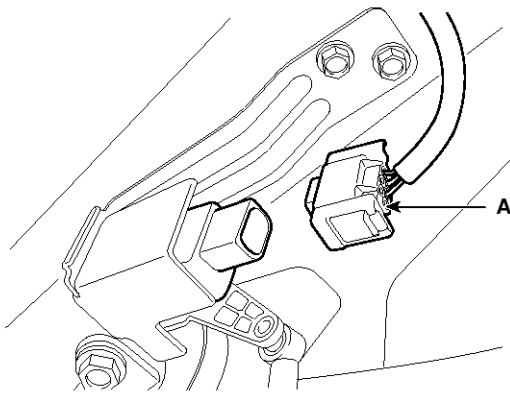


## BE-466

## Body Electrical System

### Height Sensor

1. Remove the height sensor connector (A).

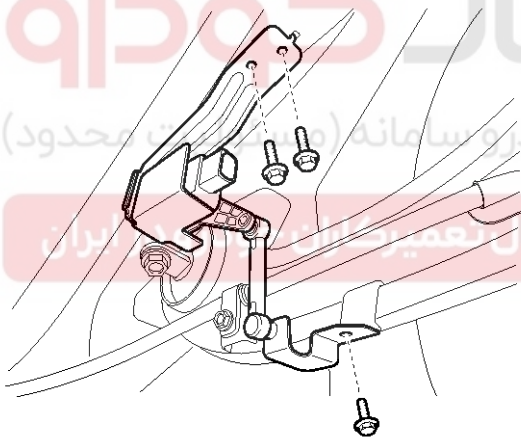


SVGBE0207D

2. Loosen the mounting bolts (Body: 2EA, chassis: 1EA) from height sensor bracket.

#### Torque :

3-5 Nm (30~50 kg.cm, 2.21 ~ 3.68 lbf.ft)

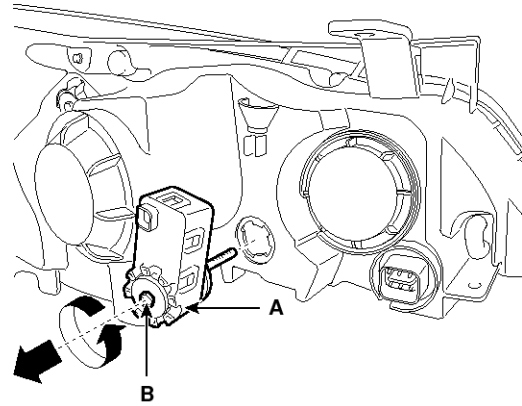


SVGBE0208D

3. Remove the height sensor.

### HLLD (head lamp leveling device) Actuator

1. Remove the head lamp.
2. Remove the HLLD (head lamp leveling device) actuator (A) after loosening the bolt (B) following the arrow direction.



SVGBE0209D

### Installation

#### AHLS (Auto Head Lamp Leveling System) Unit

1. Install the AHLS unit.
2. Install the passenger's under cover.

#### Height Sensor

1. Install the height sensor.
2. Connect the connector.

#### HLLD (Head Lamp Leveling Device) Actuator

1. Install the HLLD actuator to head lamp.
2. Install the head lamp.



# Head lamp leveling Device

## BE-467

### Inspection with GDS

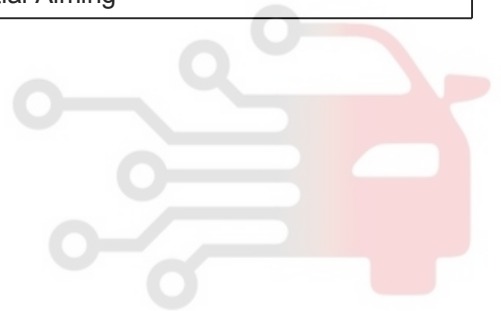
Initialization and diagnosis sequence by using GDS equipment.

Below content summarize the procedure for A/S using GDS.

| No. | Procedure                                         |
|-----|---------------------------------------------------|
| 1   | Locate vehicle to flat plane                      |
| 2   | Tire check                                        |
| 3   | IGN1 ON                                           |
| 4   | Head lamp Low Beam ON                             |
| 5   | Connection with diagnostic tool                   |
| 6   | Initial command by diagnostic tool                |
| 7   | Clear DTC Code                                    |
| 8   | IGN1 OFF → ON                                     |
| 9   | Re- Connection with diagnostic tool               |
| 10  | Checking of HLLD output value as 15% and DTC Code |
| 11  | HLLD actuating by diagnostic tool command         |
| 12  | Head lamp mechanical Initial Aiming               |

### NOTICE

1. There's no loads in vehicle and vehicle should be on flat plane.
2. Should check of HLLD output value(15%) after initial setting.
3. Should do first electrical initial setting by diagnostic tool and then mechanical aiming afterward.



# BE-468

# Body Electrical System

1. Select the vehicle model and "Head lamp leveling".

**ID Register**

➔ System Identification

**Data Treatment**

➔ Parameter Setting & Zero position Initial

**Inspection/Test**

➔ Headlamp Levelling

SXMBE9226L

2. GDS can operates actuator forcefully, input/output value monitoring and self diagnosis.

**Current Data**

Standard Display ↕
Full List ↕
Graph ↕
Items List ↕
Reset Min.Max.
Record
Stop ↕

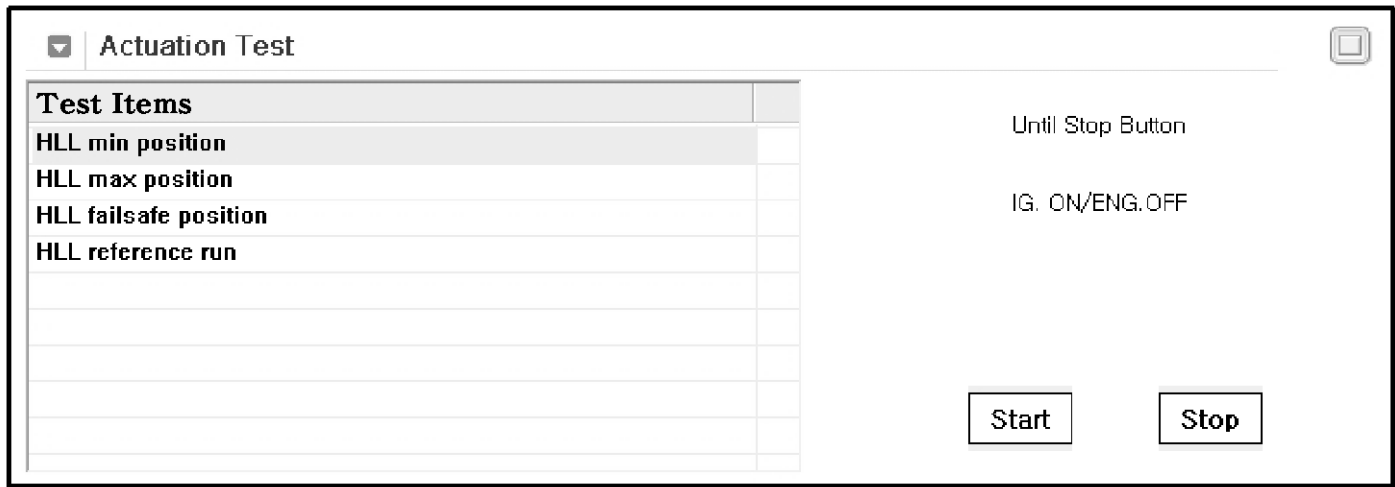
| Sensor Name                                             | Value  | Unit |
|---------------------------------------------------------|--------|------|
| <input type="checkbox"/> Vehicle Speed                  | 0      | km/h |
| <input type="checkbox"/> Actuator Clutch Position       | 0      | %    |
| <input type="checkbox"/> Sensor Angle                   | -45.00 | DEG  |
| <input type="checkbox"/> Rear height Sensor raw Voltage | 0      | mV   |
| <input type="checkbox"/> Supply voltage                 | 0.0    | V    |
| <input type="checkbox"/> Head Lamp Status               | OFF    | -    |
|                                                         |        |      |
|                                                         |        |      |

SXMBE9227L

# Head lamp leveling Device

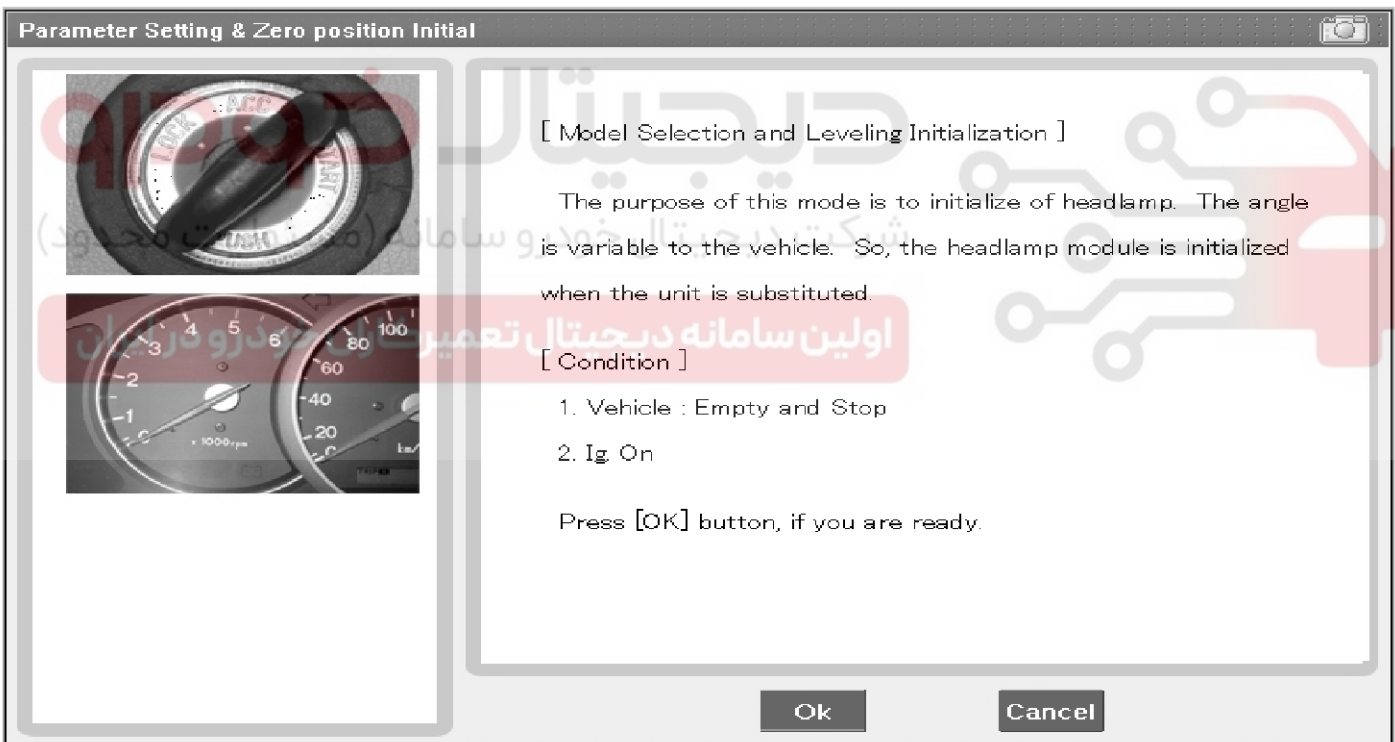
# BE-469

- To perform functional test on AHLS outputs, select "Actuation Test".



SXMBE9228L

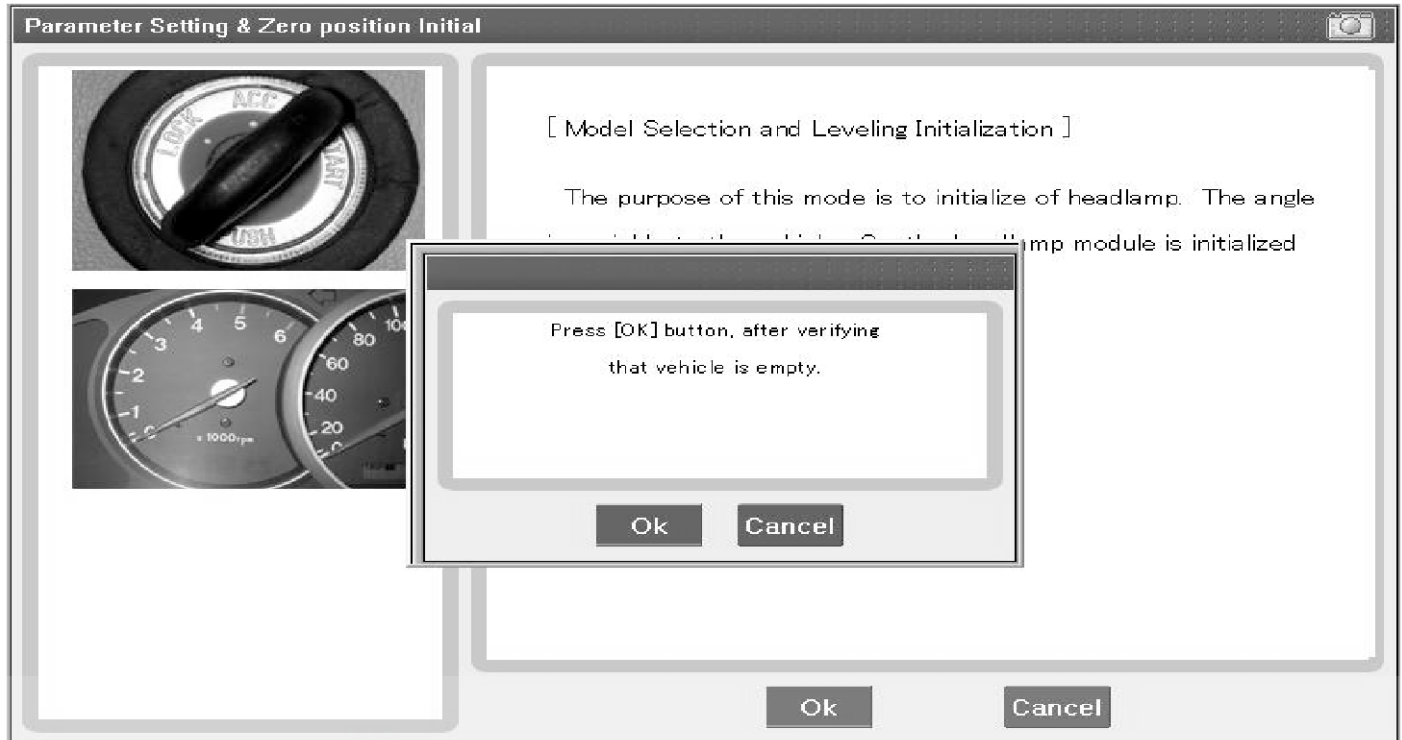
- Select "Parameter setting & Zero position Initial".



SXMBE9229L

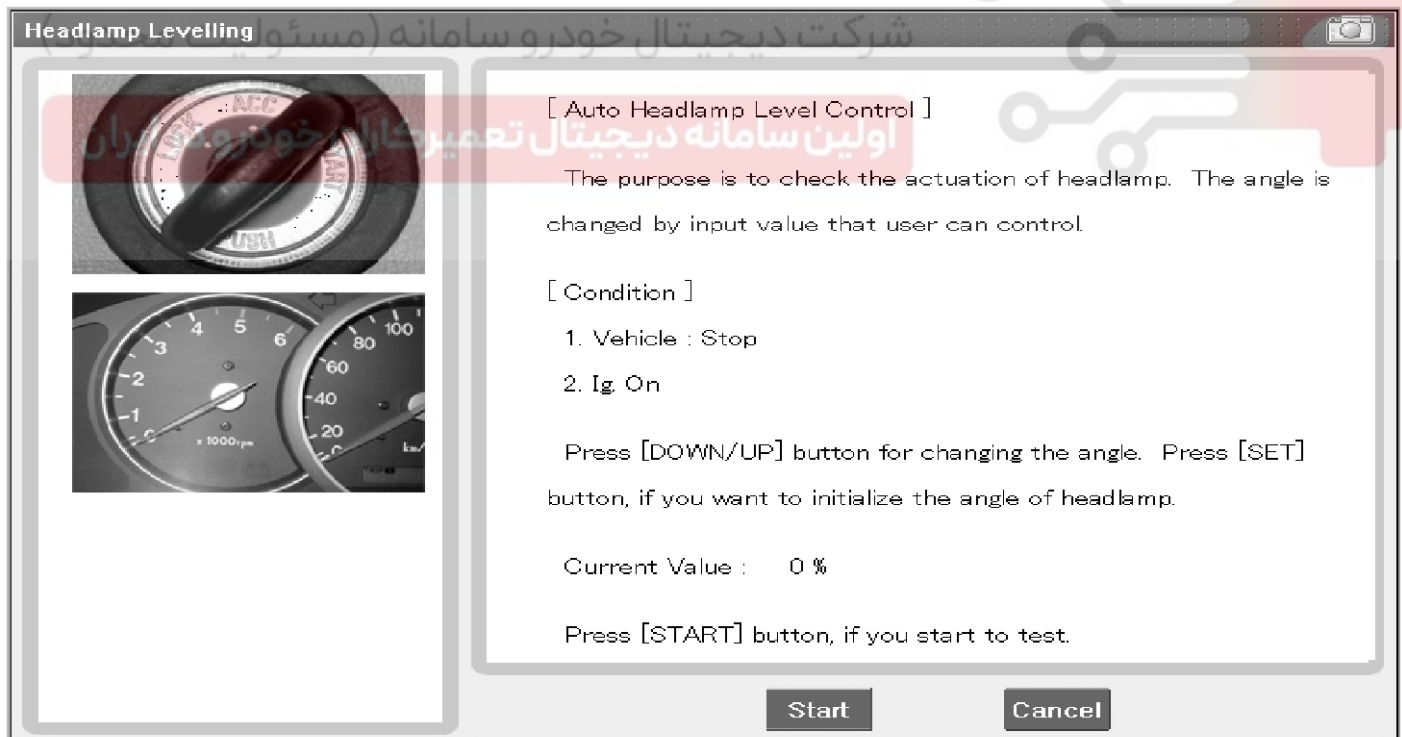
## BE-470

## Body Electrical System



SXMBE9230L

5. Confirm that AHLS operate forcefully in "Head lamp leveling" menu.

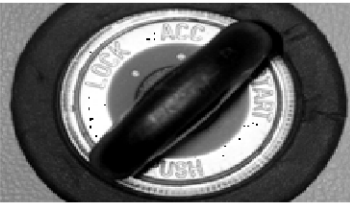



SXMBE9231L

# Head lamp leveling Device

## BE-471

Headlamp Levelling

[ Auto Headlamp Level Control ]

The purpose is to check the actuation of headlamp. The angle is changed by input value that user can control.

[ Condition ]

1. Vehicle : Stop
2. Ig On

Press [DOWN/UP] button for changing the angle. Press [SET] button, if you want to initialize the angle of headlamp.



Output Value : 0 %

Input Set Value : 15 %

Up
Down
Cancel
Set

SXMBE9232L

Headlamp Levelling

[ Auto Headlamp Level Control ]

The purpose is to check the actuation of headlamp. The angle is changed by input value that user can control.

[ Condition ]

1. Vehicle : Stop
2. Ig On

Press [DOWN/UP] button for changing the angle. Press [SET] button, if you want to initialize the angle of headlamp.

Output Value : 30 %

Input Set Value : 30 %

Up
Down
Cancel
Set

SXMBE9233L

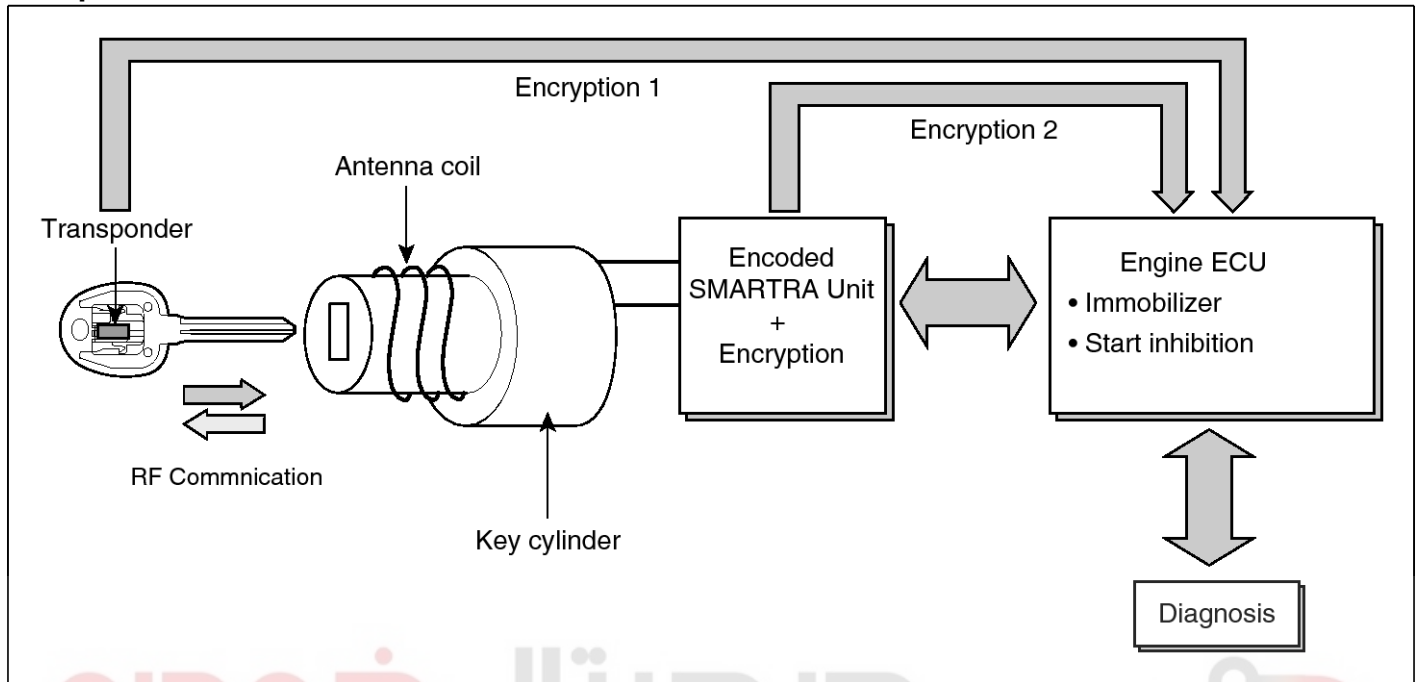
6. To check the DTC of the head lamp leveling system, select "Diagnostic trouble codes"

# BE-472

# Body Electrical System

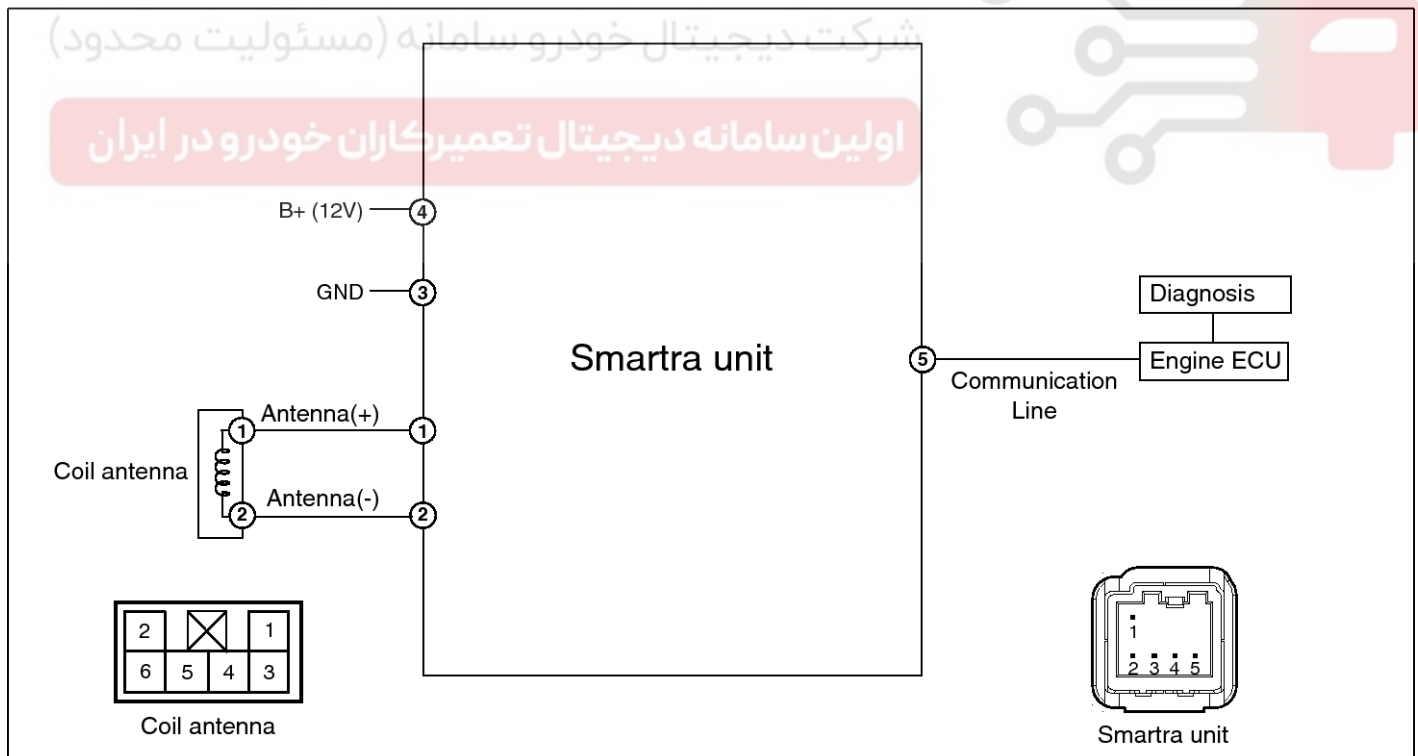
## Immobilizer System

### Components



SYFBE0221L

### Circuit Diagram



SVGBE0402L

# Immobilizer System

## BE-473

### Description

The immobilizer system will disable the vehicle unless the proper ignition key is used, in addition to the currently available anti-theft systems such as car alarms, the immobilizer system aims to drastically reduce the rate of auto theft.

#### 1. Encrypted SMARTRA type immobilizer

- The SMARTRA system consists of a passive challenge - response (mutual authentication) transponder located in the ignition key, an antenna coil, an encoded SMARTRA unit, an indicator light and the PCM(ECM).
- The SMARTRA communicates to the PCM(ECM) (Engine Control Module) via a dedicated communications line. Since the vehicle engine management system is able to control engine mobilization, it is the most suitable unit to control the SMARTRA.
- When the key is inserted in the ignition and turned to the ON position, the antenna coil sends power to the transponder in the ignition key. The transponder then sends a coded signal back through the SMARTRA unit to the PCM(ECM).
- If the proper key has been used, the PCM(ECM) will energize the fuel supply system. The immobilizer indicator light in the cluster will simultaneously come on for more than five seconds, indicating that the SMARTRA unit has recognized the code sent by the transponder.
- If the wrong key has been used and the code was not received or recognized by the PCM(ECM) the indicator light will continue blinking for about five seconds until the ignition switch is turned OFF.
- If it is necessary to rewrite the PCM(ECM) to learn a new key, the dealer needs the customer's vehicle, all its keys and the GDS equipped with an immobilizer program card. Any key that is not learned during rewriting will no longer start the engine.
- The immobilizer system can store up to eight key codes.
- If the customer has lost his key, and cannot start the engine, contact Hyundai motor service station.

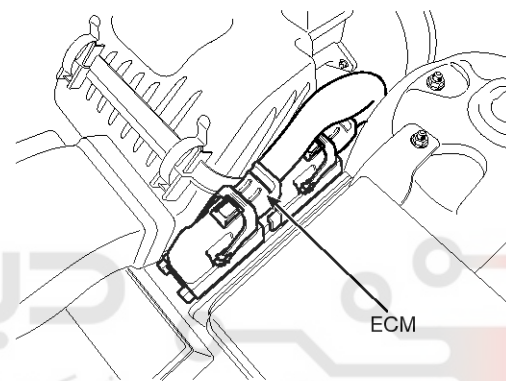
### Components Operations

#### PCM (Power Train Control Module)

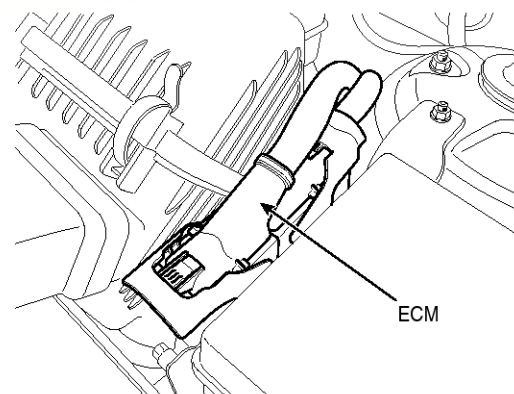
1. The PCM(ECM) (A) carries out a check of the ignition key using a special encryption algorithm, which is programmed into the transponder as well as the PCM(ECM) simultaneously. Only if the results are equal, the engine can be started. The data of all transponders, which are valid for the vehicle, are stored in the PCM(ECM).

ERN (Encrypted Random Number) value between EMS and encrypted smartra unit is checked and the validity of coded key is decided by EMS.

#### [G6DC - 3.5 gasoline]



#### [G4KE - 2.4 gasoline]





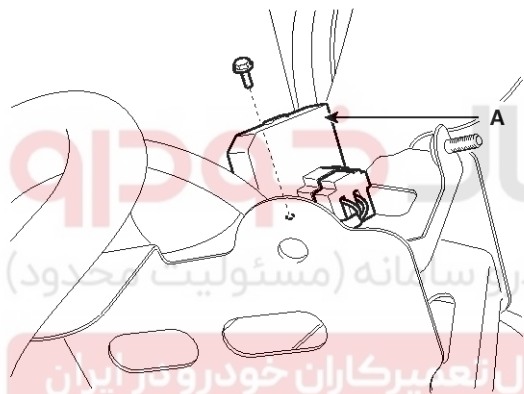
## BE-474

### ENCRYPTED SMARTRA unit (A)

The SMARTRA carries out communication with the built-in transponder in the ignition key. This wireless communication runs on RF (Radio frequency of 125 kHz). The SMARTRA is mounted behind of the crash pad close to center cross bar.

The RF signal from the transponder, received by the antenna coil, is converted into messages for serial communication by the SMARTRA device. And, the received messages from the PCM(ECM) are converted into an RF signal, which is transmitted to the transponder by the antenna.

The SMARTRA does not carry out the validity check of the transponder or the calculation of encryption algorithm. This device is only an advanced interface, which converts the RF data flow of the transponder into serial communication to the PCM(ECM) and vice versa.

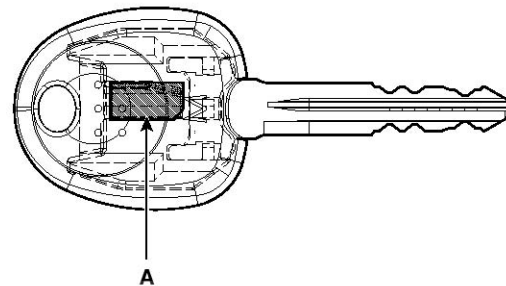


SVGBE0377D

## Body Electrical System

### TRANSPONDER (Built-in keys)

The transponder (A) has an advanced encryption algorithm. During the key teaching procedure, the transponder will be programmed with vehicle specific data. The vehicle specific data are written into the transponder memory. The write procedure is once only; therefore, the contents of the transponder can never be modified or changed.



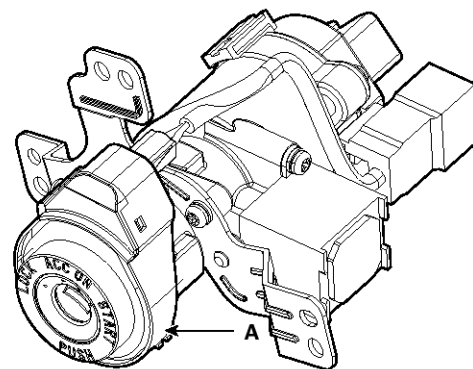
SYFBE0347D

### Antenna coil

The antenna coil (A) has the following functions.

- The antenna coil supplies energy to the transponder.
- The antenna coil receives signal from the transponder.
- The antenna coil sends transponder signal to the SMARTRA.

It is located directly in front of the steering handle lock.



SVGBE0215D

# Immobilizer System

## BE-475

### Teaching Procedures

#### 1. Key Teaching Procedure

Key teaching must be done after replacing a defective PCM(ECM) or when providing additional keys to the vehicle owner.

The procedure starts with an PCM(ECM) request for vehicle specific data (PIN code: 6digits) from the tester. The "virgin" PCM(ECM) stores the vehicle specific data and the key teaching can be started. The "learnt" PCM(ECM) compares the vehicle specific data from the tester with the stored data. If the data are correct, the teaching can proceed.

If incorrect vehicle specific data have been sent to the PCM(ECM) three times, the PCM(ECM) will reject the request of key teaching for one hour. This time cannot be reduced by disconnecting the battery or any other manipulation. After reconnecting the battery, the timer starts again for one hour.

The key teaching is done by ignition on with the key and additional tester commands. The PCM(ECM) stores the relevant data in the EEPROM and in the transponder. Then the PCM(ECM) runs the authentication required for confirmation of the teaching process. The successful programming is then confirmed by a message to the tester.

If the key is already known to the PCM(ECM) from a previous teaching, the authentication will be accepted and the EEPROM data are updated. There is no changed transponder content (this is impossible for a learnt transponder).

The attempt to repeatedly teach a key, which has been taught already during the same teaching cycle, is recognized by the PCM(ECM). This rejects the key and a message is sent to the tester.

The PCM(ECM) rejects invalid keys, which are presented for teaching. A message is sent to the tester. The key can be invalid due to faults in the transponder or other reasons, which result from unsuccessful programming of data. If the PCM(ECM) detects different authenticators of a transponder and an PCM(ECM), the key is considered to be invalid.

The maximum number of taught keys is 8

If an error occurs during the Immobilizer Service Menu, the PCM(ECM) status remains unchanged and a specific fault code is stored.

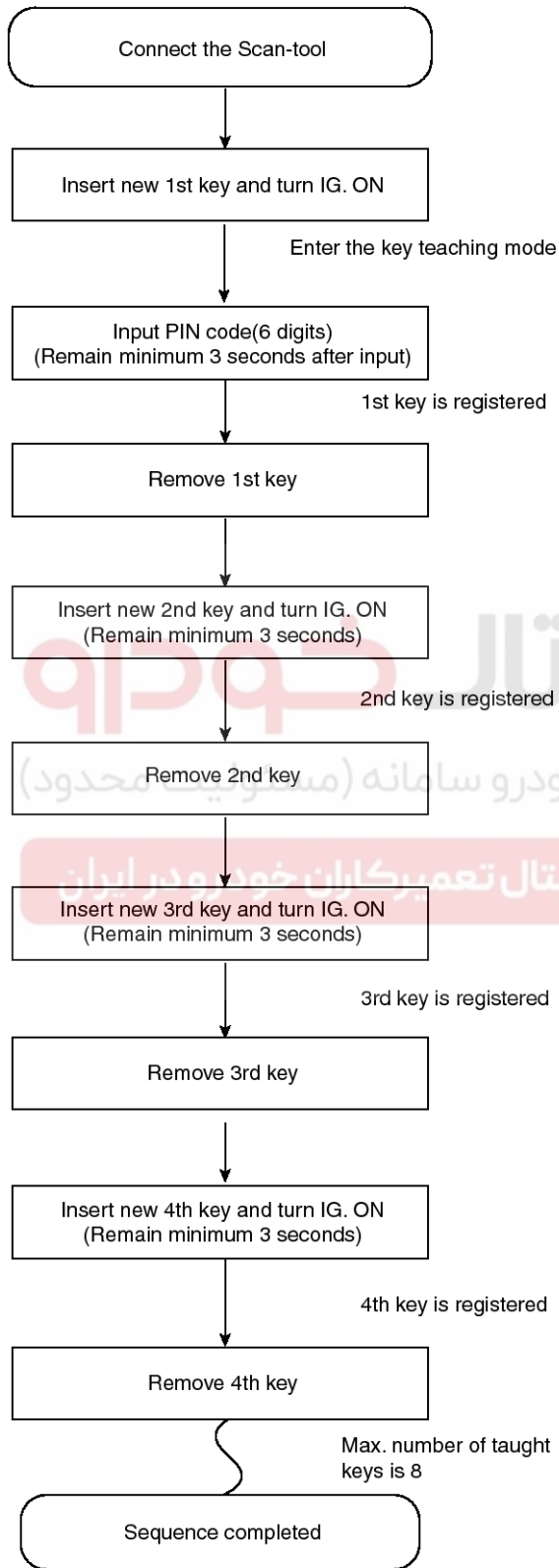
If the PCM(ECM) status and the key status do not match for teaching of keys, the tester procedure will be stopped and a specific fault code will be stored at PCM(ECM).

# BE-476

# Body Electrical System

**NOTICE**

When teaching the 1st key, Smartra registers at the same time.




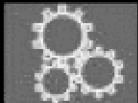










SFDBE8405L

1) PCM(ECM) learnt status.



# Immobilizer System

# BE-477

| Select System                                                                               |                                                                                           |                                                                                          |                                                                                             |                                                                                              | Selected                                                                                                               |
|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| <br>ENGINE | <br>A/T  | <br>ESP | <br>AIRBAG | <br>AIR/CON | <br><b>IMMO</b><br>Immobilizer(IMMO) |
| <br>AHLS   | <br>IMMO | <br>PIC | <br>TPMS   | <br>BCM     |                                                                                                                        |
| <br>CODE   |                                                                                           |                                                                                          |                                                                                             |                                                                                              |                                                                                                                        |
|                                                                                             |                                                                                           |                                                                                          |                                                                                             |                                                                                              |                                                                                                                        |
|                                                                                             |                                                                                           |                                                                                          |                                                                                             |                                                                                              |                                                                                                                        |
|                                                                                             |                                                                                           |                                                                                          |                                                                                             |                                                                                              |                                                                                                                        |

SYFBE0312L

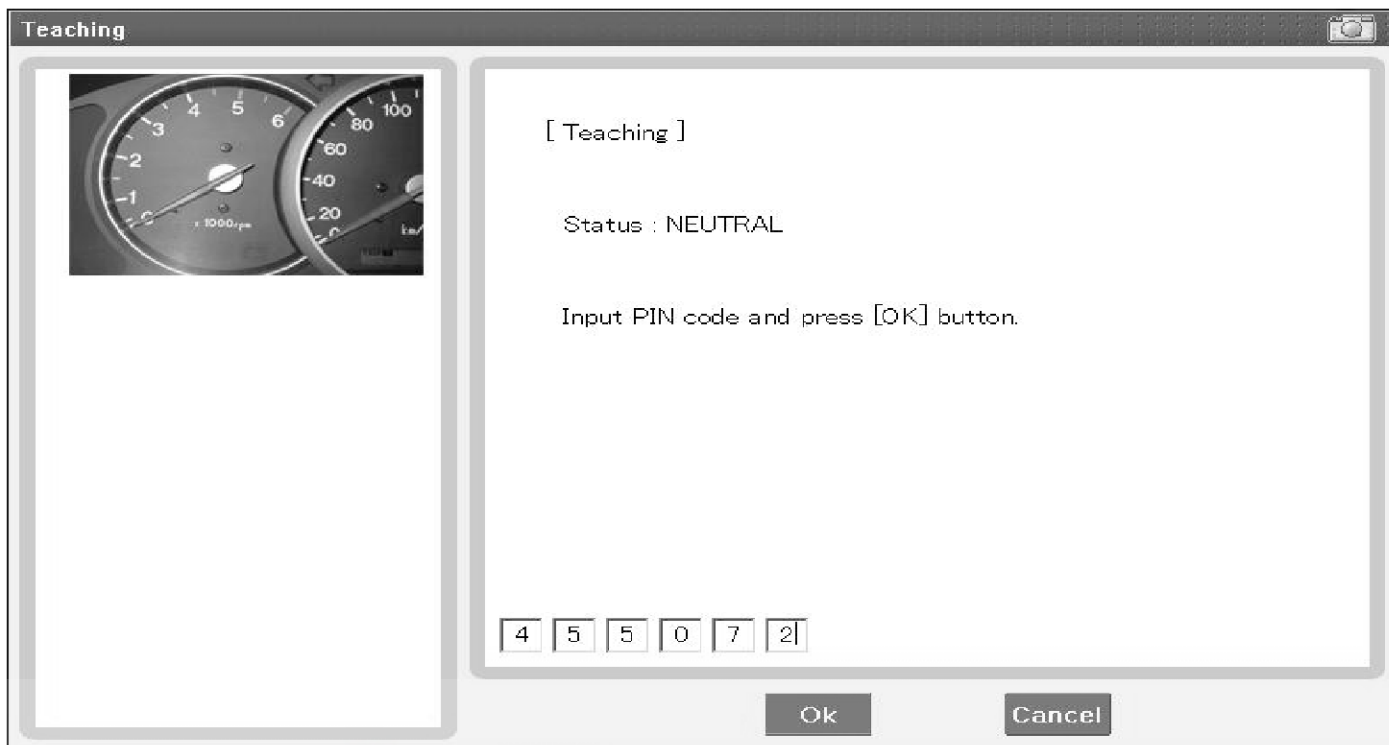
ID Register

- Password Teaching/Changing
- Neutral Mode
- Limp Home Mode
- Smatra Neutral Mode
- Teaching

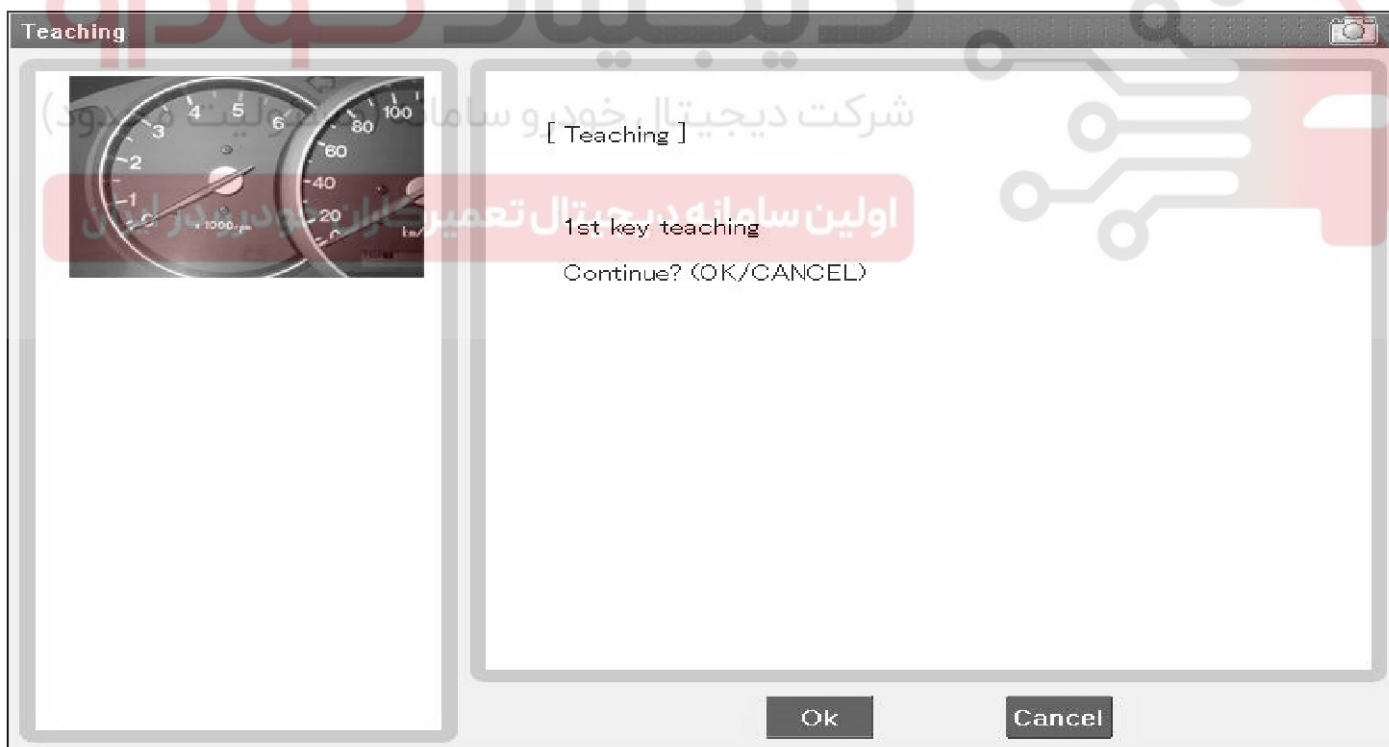
SBKBE9153N

# BE-478

# Body Electrical System



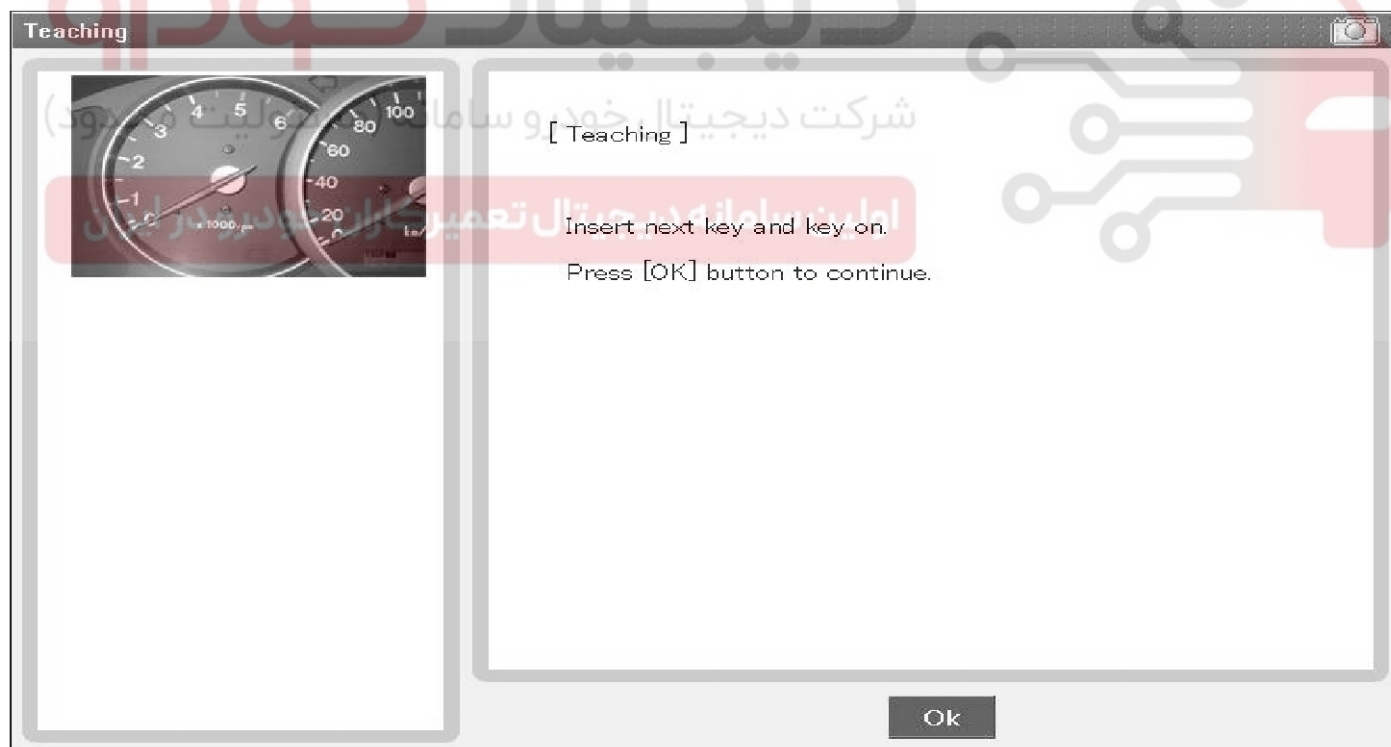
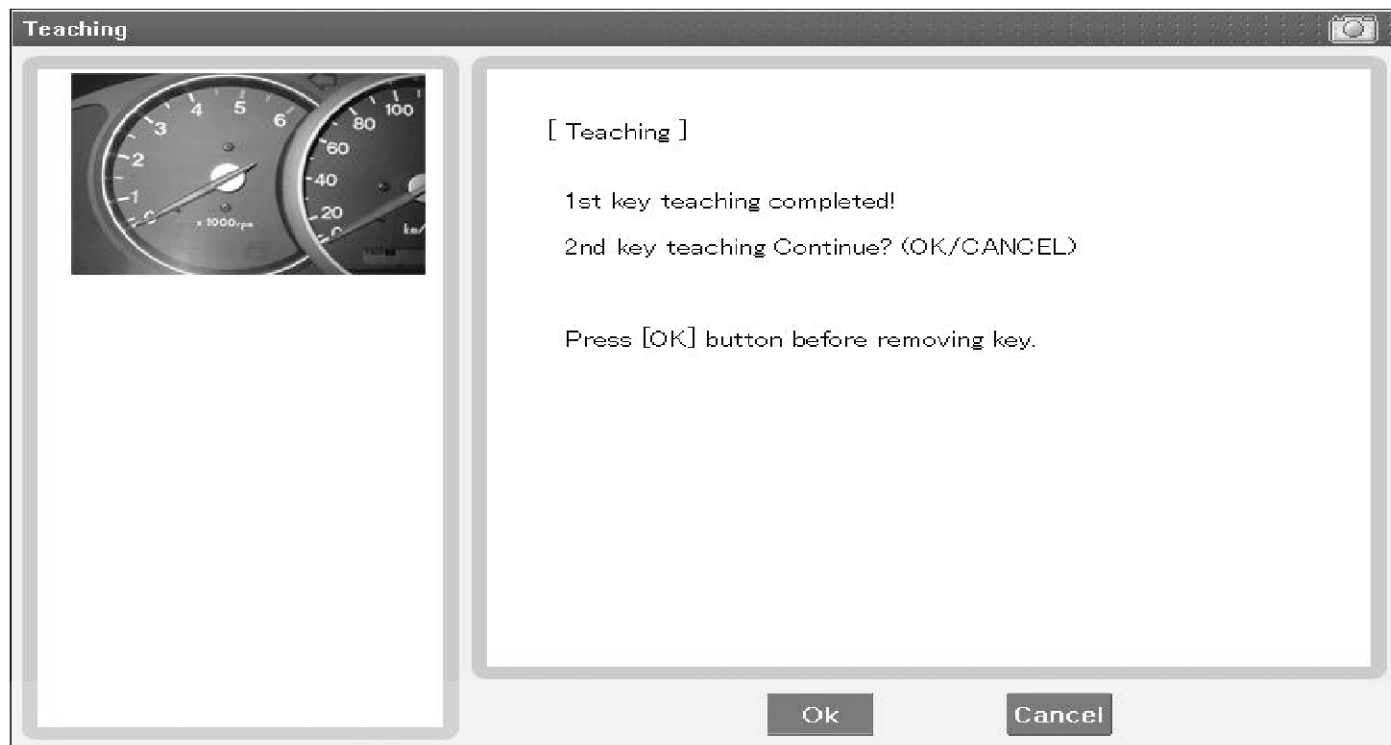
SBKBE9114N



SBKBE9115N

# Immobilizer System


# BE-479



# BE-480

# Body Electrical System

Teaching



[ Teaching ]


2nd key teaching completed!  
3rd key teaching Continue? (OK/CANCEL)

Press [OK] button before removing key.

Ok Cancel

SBKBE9118N

Teaching



[ Teaching ]

Insert next key and key on.  
Press [OK] button to continue.

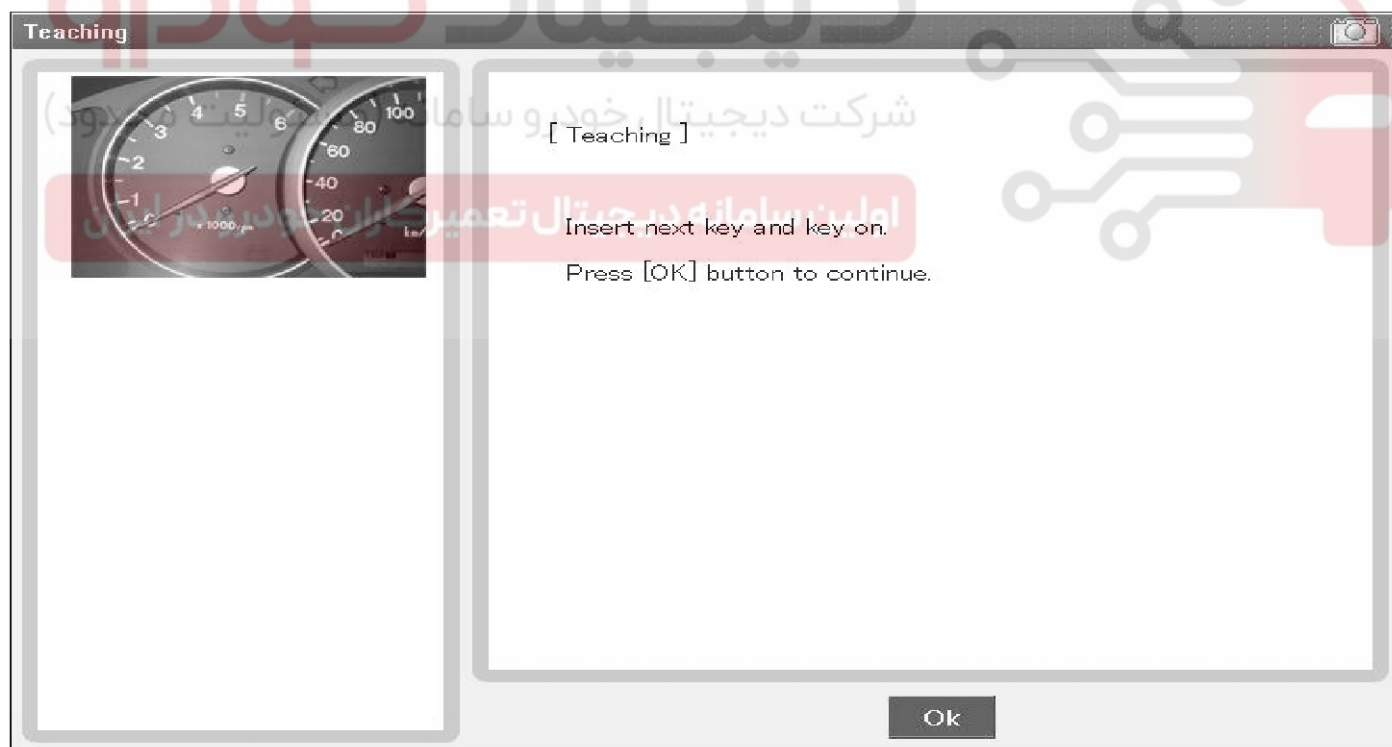
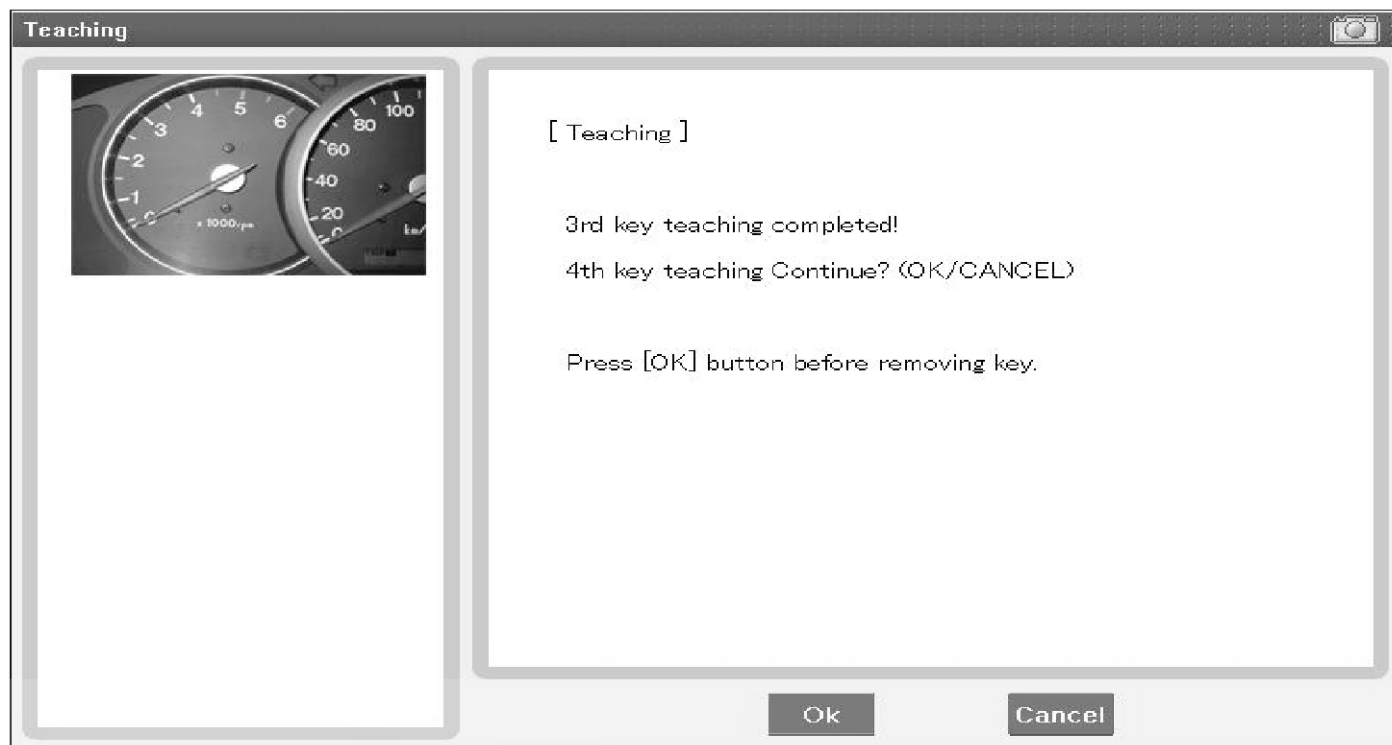
Ok

SBKBE9119N



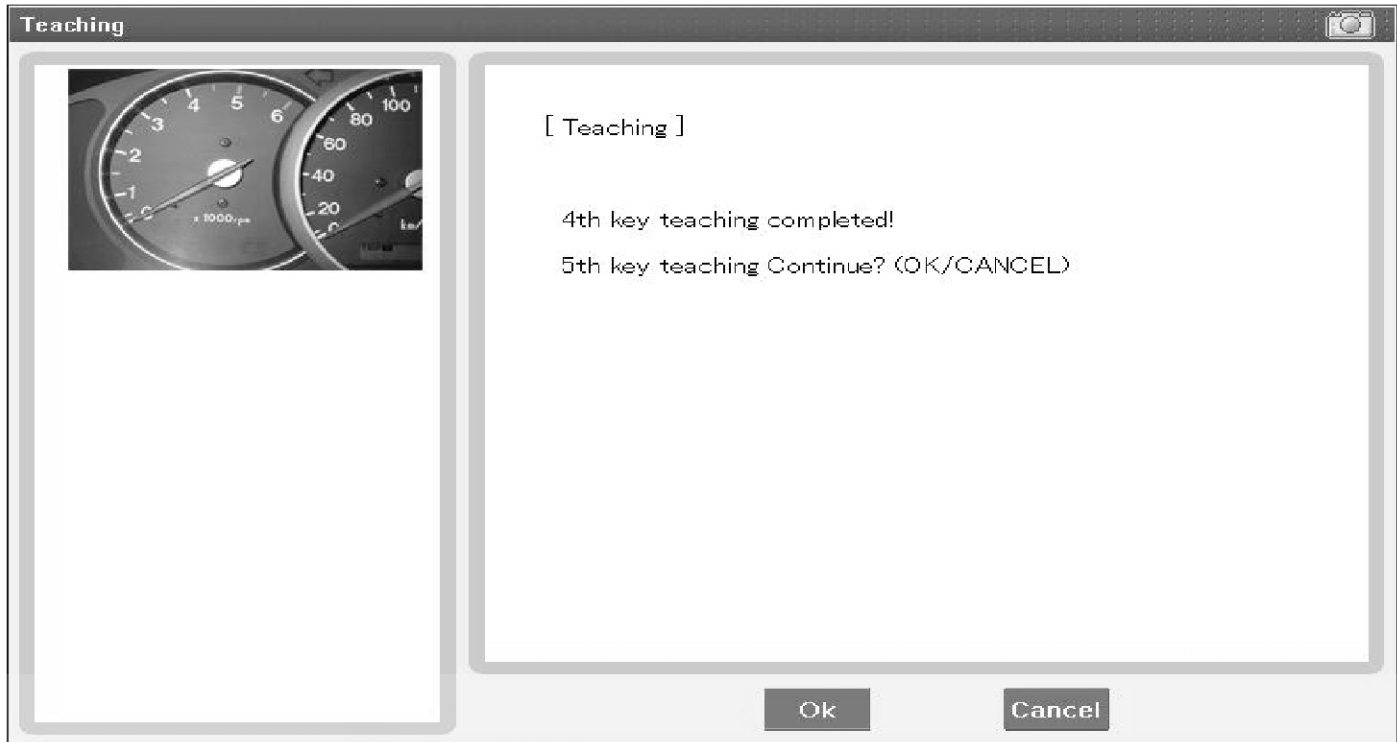
# Immobilizer System

# BE-481



## BE-482

## Body Electrical System



SBKBE9122N

## 2) PCM(ECM) virgin status.

After replacing new "PCM(ECM)" GDS displays that PCM(ECM) is virgin status in Key Teaching mode.

"VIRGIN" status means that PCM(ECM) has not matched any PIN code before.

## 2. User Password Teaching Procedure

The user password for limp home is taught at the service station. The owner of the vehicle can select a number with four digits.

The user password teaching is only accepted by a "learnt" PCM(ECM). Before first teaching of user password to an PCM(ECM), the status of the password is "virgin" No limp home function is possible.

The teaching is started by ignition on, with a valid key(learnt key) and sending the user password by tester. After successful teaching, the status of the user password changes from "virgin" to "learnt"

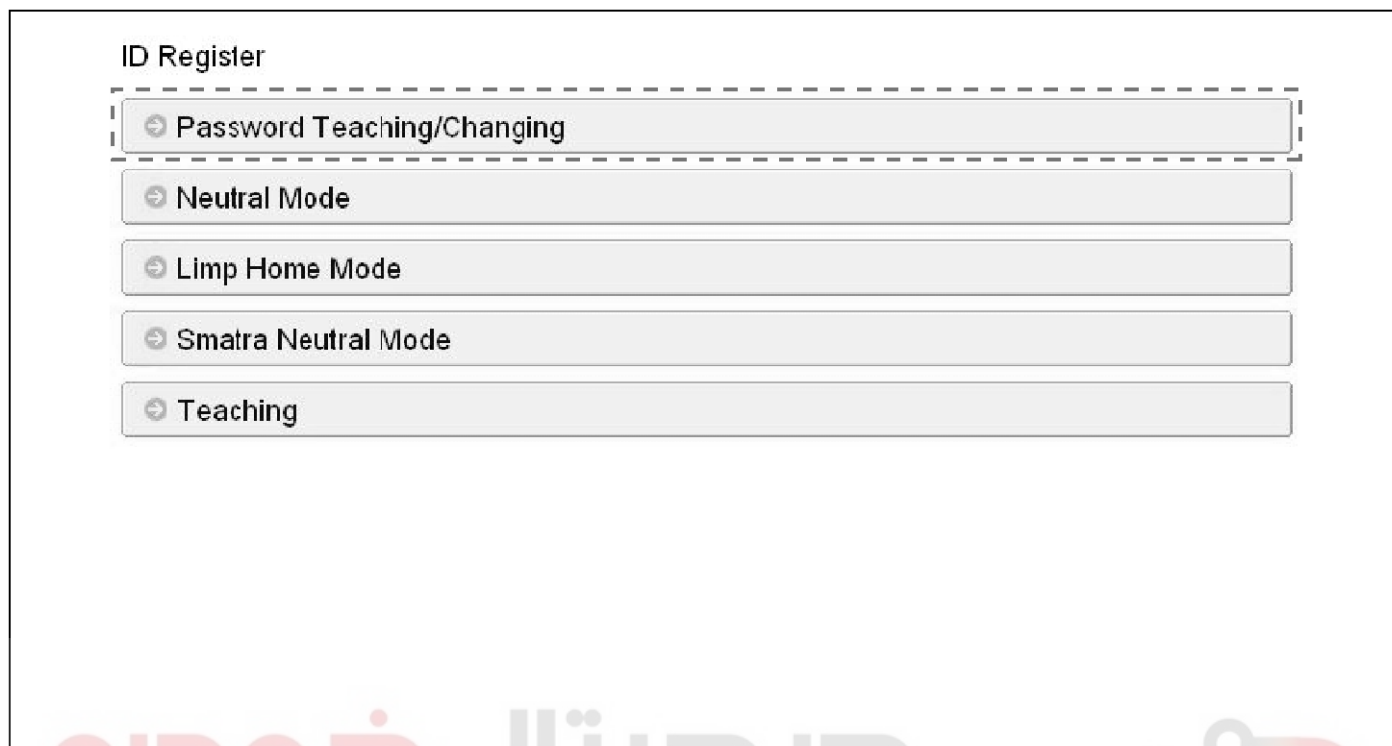
The learnt user password can also be changed. This can be done if the user password status is "learnt" and the tester sends authorization of access, either the old user password or the vehicle specific data. After correct authorization, the PCM(ECM) requests the new user password. The status remains "learnt" and the new user password will be valid for the next limp home mode.

If wrong user passwords or wrong vehicle specific data have been sent to the PCM(ECM) three times continuously or intermittently, the PCM(ECM) will reject the request to change the password for one hour. This time cannot be reduced by disconnecting the battery or any other actions. After reconnecting the battery, the timer starts again for one hour.

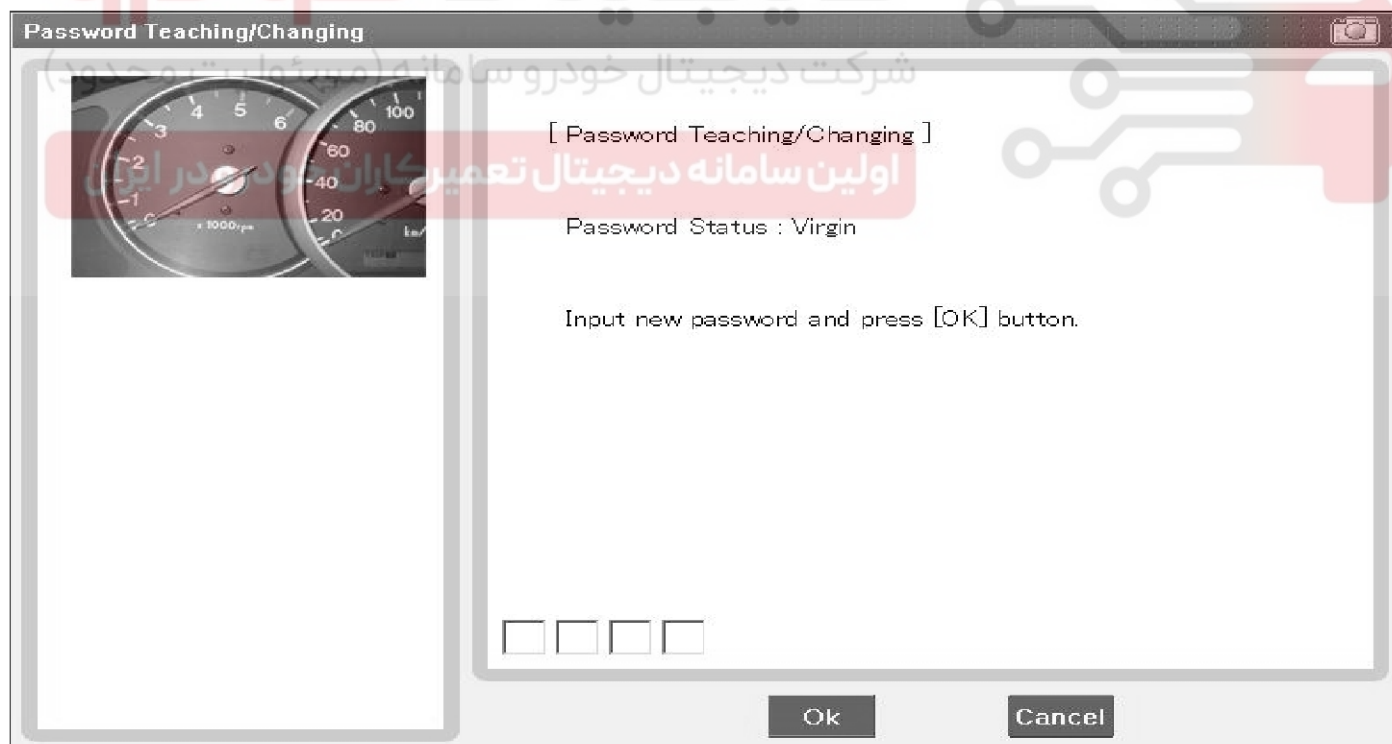
# Immobilizer System

# BE-483

## 1) User password teaching



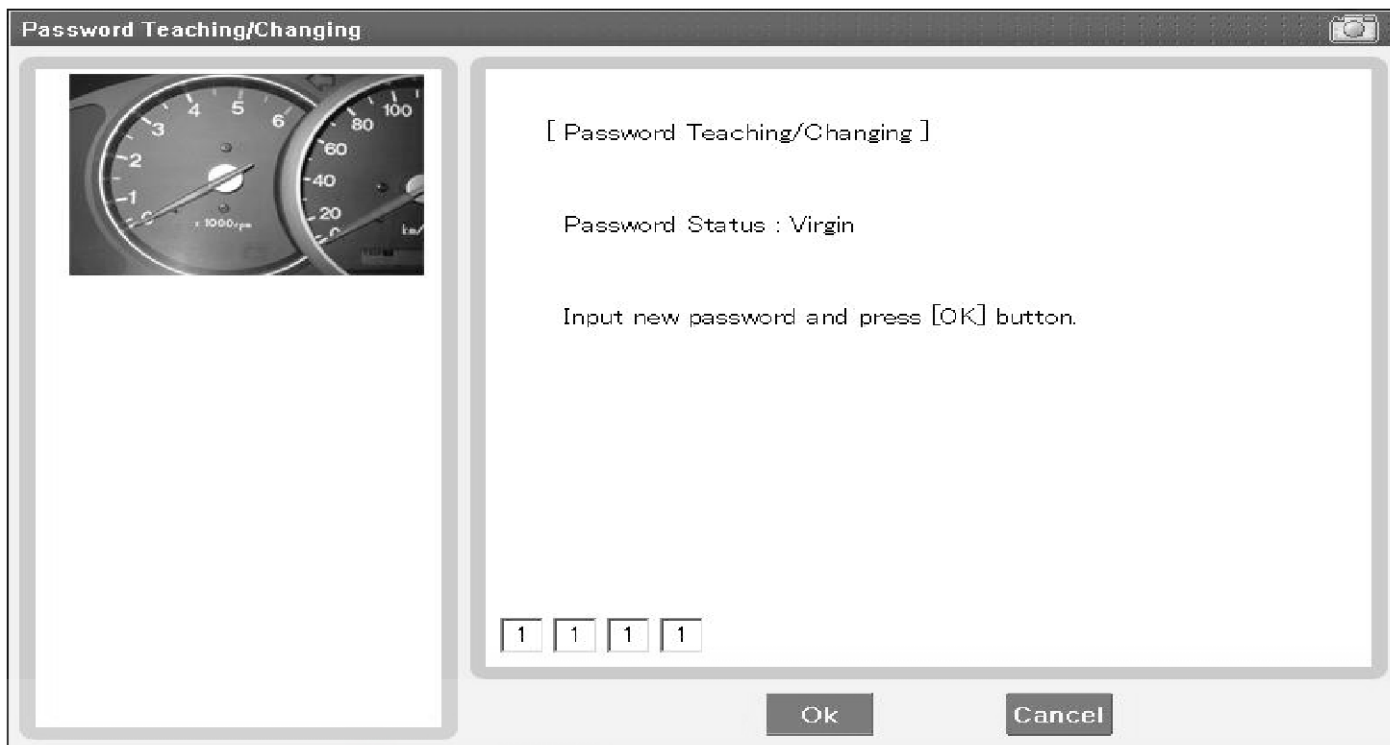
SBKBE9154N



SBKBE9123N

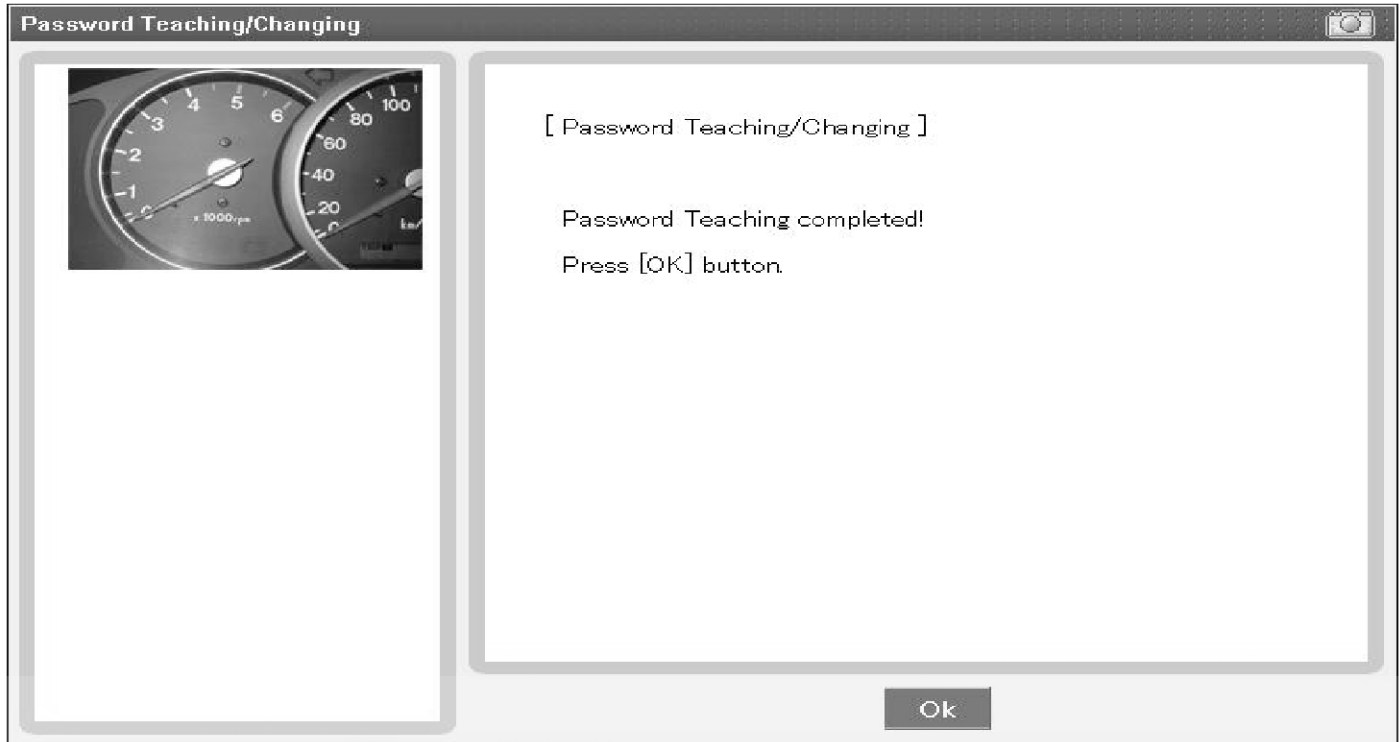
# BE-484

# Body Electrical System



# Immobilizer System

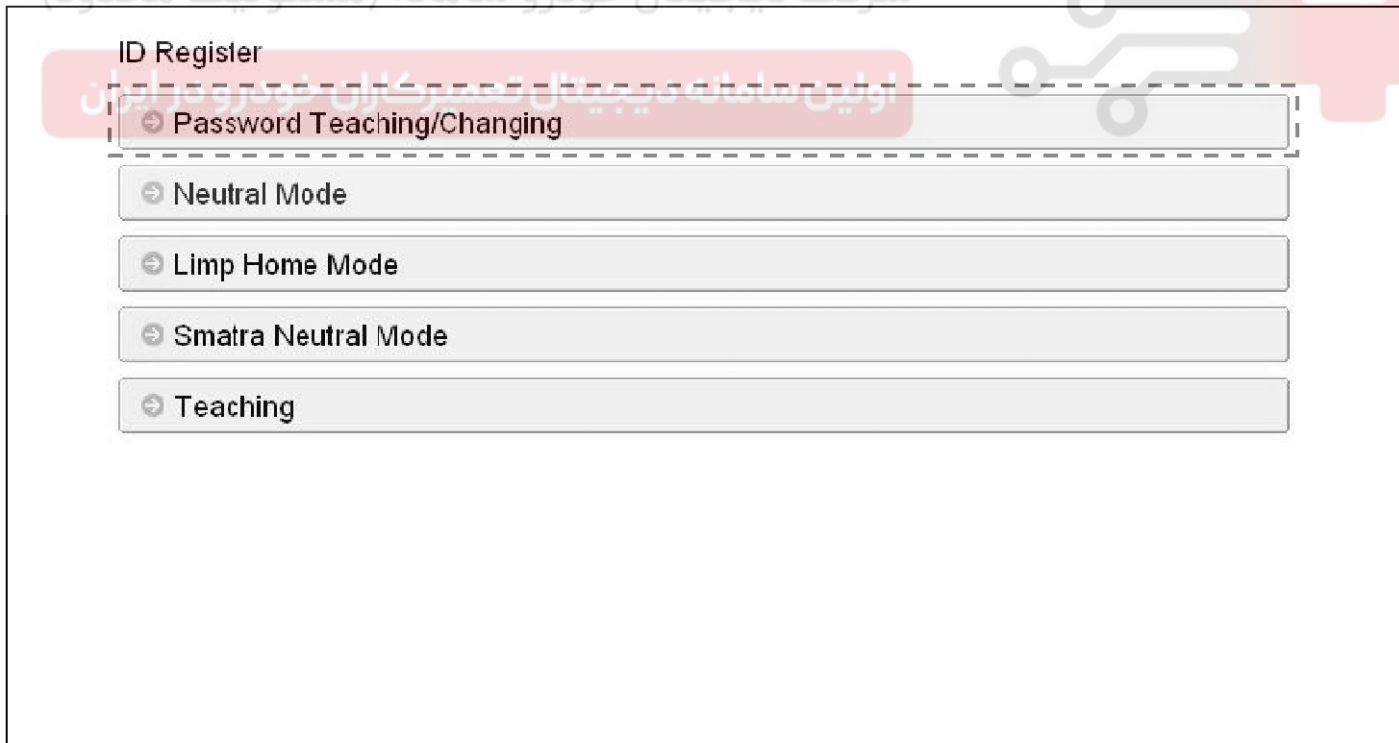
# BE-485



SBKBE9126N

※ In case of putting wrong password, retry from first step after 10 seconds.

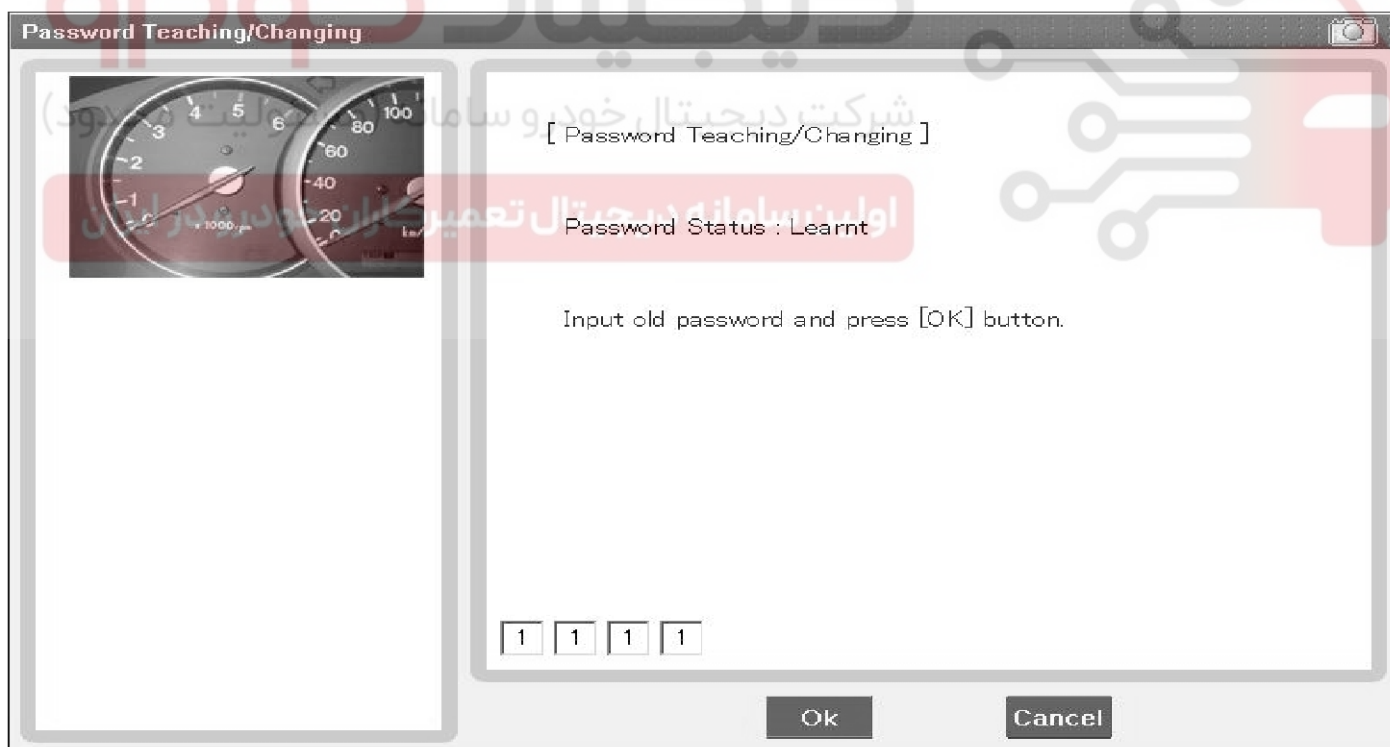
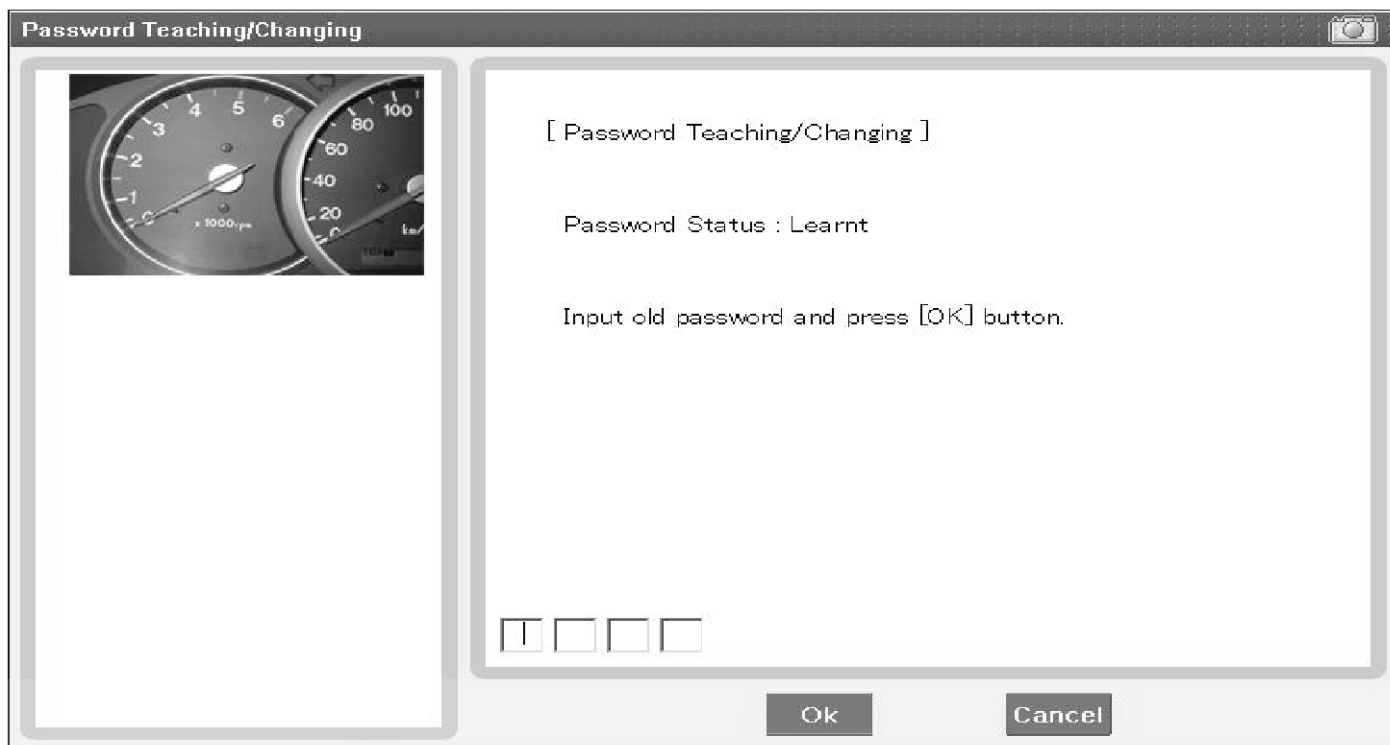
2) User password changing



SBKBE9154N

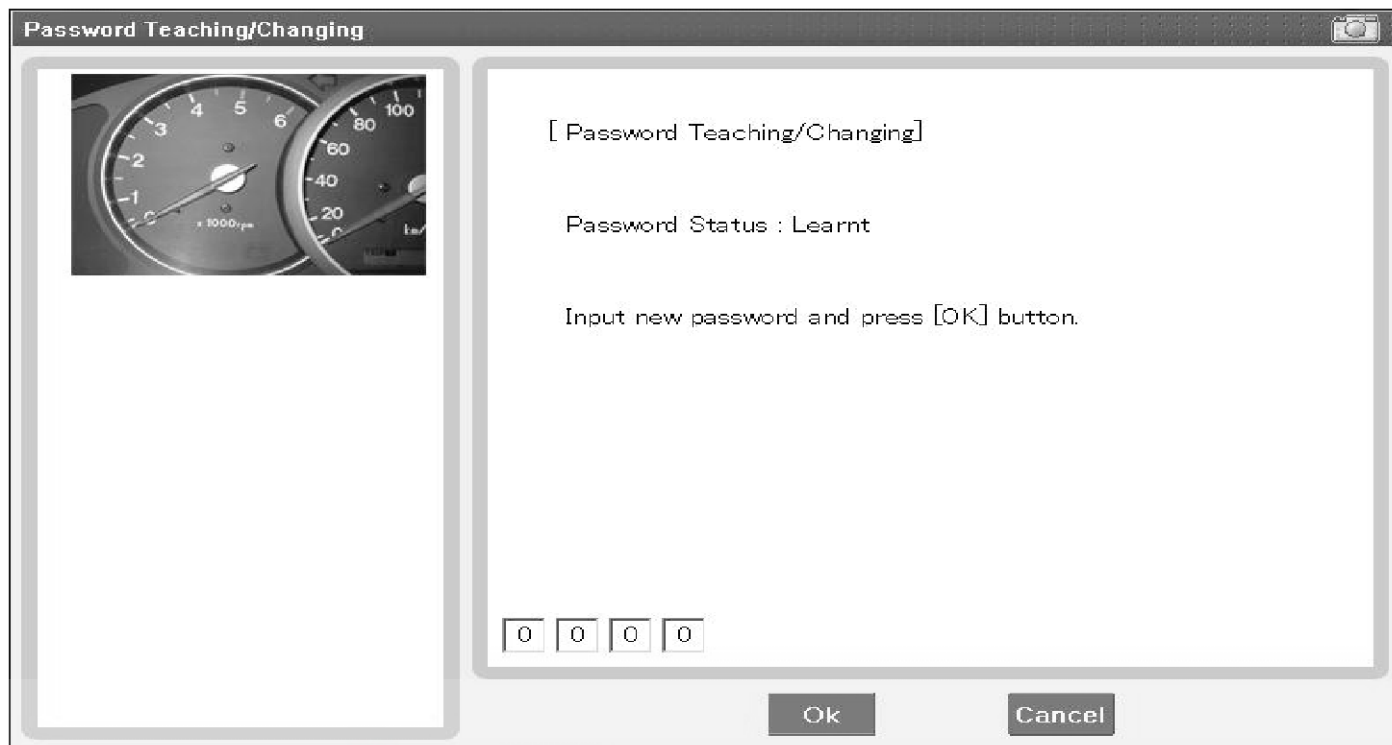
# BE-486

# Body Electrical System

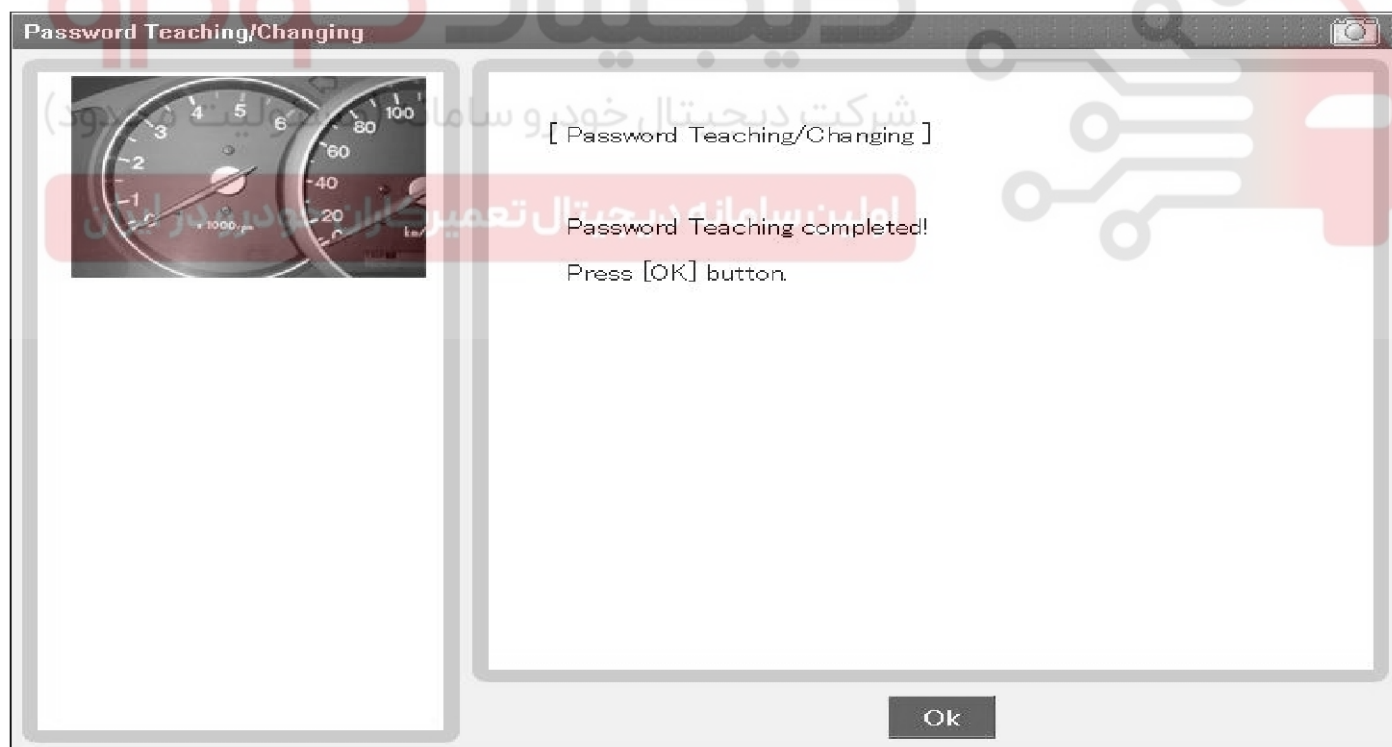


# Immobilizer System

# BE-487



SBKBE9129N



SBKBE9131N



## BE-488

## Body Electrical System

### Limp Home Function

#### 1. Limp Home By Tester

If the PCM(ECM) detects the fault of the SMARTRA or transponder, the PCM(ECM) will allow limp home function of the immobilizer. Limp home is only possible if the user password (4 digits) has been given to the PCM(ECM) before. This password can be selected by the vehicle owner and is programmed at the service station.

The user password can be sent to the PCM(ECM) via the special tester menu.

Only if the PCM(ECM) is in status "learnt" and the user password status is "learnt" and the user password is correct, the PCM(ECM) will be unlocked for a period of time (30 sec.). The engine can only be started during this time. After the time has elapsed, engine start is not possible.

If the wrong user password is sent, the PCM(ECM) will reject the request of limp home for one hour. Disconnecting the battery or any other action cannot reduce this time. After connecting the battery to the PCM(ECM), the timer starts again for one hour.

#### ID Register

→ Password Teaching/Changing

→ Neutral Mode

→ Limp Home Mode

→ Smatra Neutral Mode

→ Teaching

شرکت دیجیتال خودرو (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

SBKBE9155N

# Immobilizer System

# BE-489



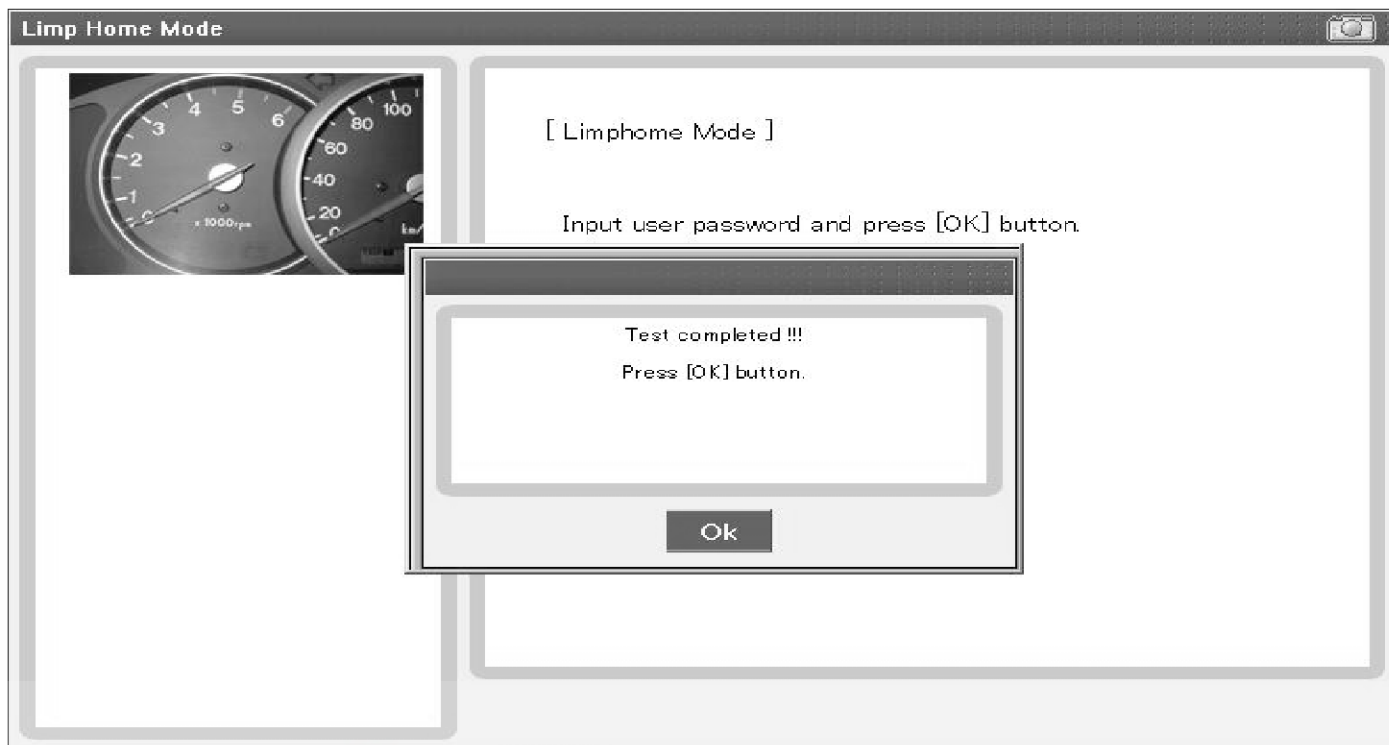
SBKBE9132N



SBKBE9133N

# BE-490

# Body Electrical System



# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



# Immobilizer System

# BE-491

## 2. Limp Home By Ignition Key

The limp home can be activated also by the ignition key. The user password can be input to the PCM(ECM) by a special sequence of ignition on/off.

Only if the PCM(ECM) is in status "learnt" and the user password status is "learnt" and the user password is correct, the PCM(ECM) will be unlocked for a period of time (30 sec.).

The engine can be started during this time. After the time has elapsed, engine start is not possible. After a new password has been input, the timer (30 sec.) will start again.

After ignition off, the PCM(ECM) is locked if the timer has elapsed 8 seconds. For the next start, the input of the user password is requested again.



LTIF740N

# BE-492

# Body Electrical System

## Replacement

### Problems And Replacement Parts:

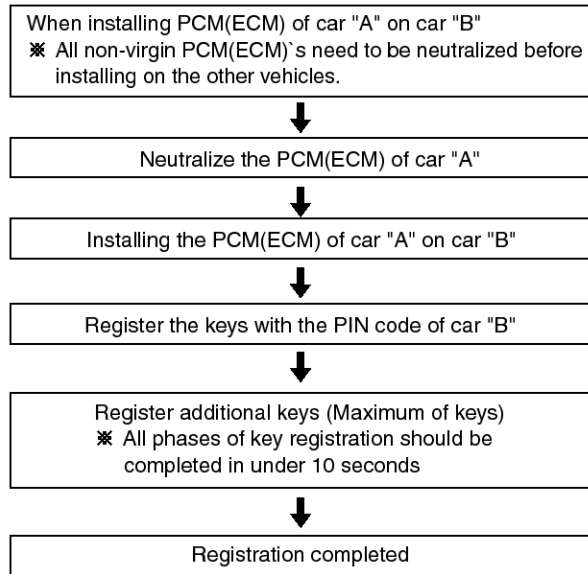
| Problem                                   | Part set                               | GDS required? |
|-------------------------------------------|----------------------------------------|---------------|
| All keys have been lost                   | Blank key (4)                          | YES           |
| Antenna coil unit does not work           | Antenna coil unit                      | NO            |
| ECM does not work                         | PCM(ECM)                               | YES           |
| Ignition switch does not work             | Ignition switch with Antenna coil unit | YES           |
| Unidentified vehicle specific data occurs | Key, PCM(ECM)                          | YES           |
| SMARTRA unit does not work                | SMARTRA unit                           | YES           |

### Replacement Of Ecm And Smartra

In case of a defective ECM, the unit has to be replaced with a "virgin" or "neutral" ECM. All keys have to be taught to the new ECM. Keys, which are not taught to the ECM, are invalid for the new ECM (Refer to key teaching procedure). The vehicle specific data have to be left unchanged due to the unique programming of transponder.

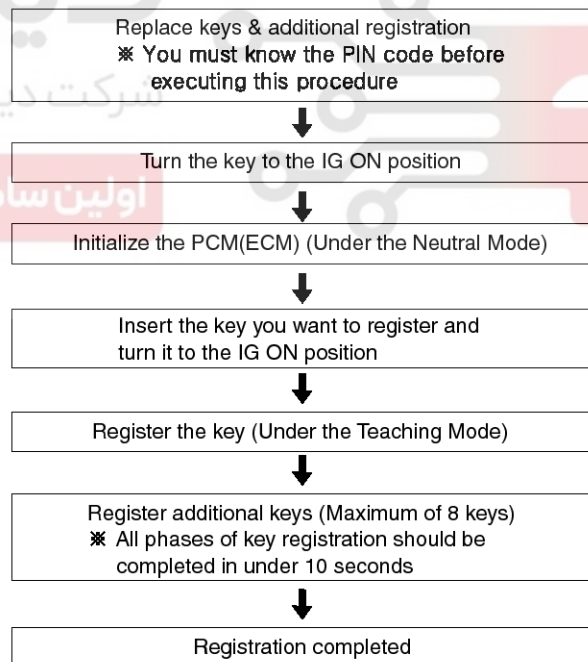
In case of a defective SMARTRA, it needs teaching the smartra. A new SMARTRA device replaces the old one and smartra need teaching.

### 1. Things to remember before a replacement (PCM(ECM))



ETBF746A

### 2. Things to remember before a replacement (Keys & Additional registration)



SYFBE0223L

# Immobilizer System

## BE-493

### NOTICE

1. When there is only one key registered and you wish to register another key, you need to re-register the key which was already registered.
2. When the key #1 is registered and master key #2 is not registered, Put the key #1 in the IG/ON or the start position and remove it. The engine can be started with the unregistered key #2.  
(Note that key #2 must be used within 10 seconds of removing key #1)
3. When the key #1 is registered and key #2 is not registered, put the unregistered master key #2 in the IG/ON or the start position.  
The engine cannot be started even with the registered key #1.
4. When you inspect the immobilizer system, refer to the above paragraphs 1, 2 and 3.  
Always remember the 10 seconds zone.
5. If the pin code & password are entered incorrectly on three consecutive inputs, the system will be locked for one hour.
6. Be cautious not to overlap the transponder areas.
7. Problems can occur at key registration or vehicle starting if the transponders should overlap.

### Neutralizing Of ECM

The PCM(ECM) can be set to the "neutral" status by a tester.

A valid ignition key is inserted and after ignition on is recorded, the PCM(ECM) requests the vehicle specific data from the tester. The communication messages are described at "Neutral Mode" After successfully receiving the data, the PCM(ECM) is neutralized.

The ECM remains locked. Neither the limp home mode nor the "twice ignition on" function, is accepted by the PCM(ECM).

The teaching of keys follows the procedure described for the virgin PCM(ECM). The vehicle specific data have to be unchanged due to the unique programming of the transponder. If data should be changed, new keys with a virgin transponder are requested.

This function is for neutralizing the PCM(ECM) and Key. Ex) when lost key, Neutralize the PCM(ECM) then teach keys.

(Refer to the Things to do when Key & PIN Code the PCM(ECM) can be set to the "neutral" status by a scanner. If wrong vehicle specific data have been sent to SMATRA three times continuously or intermittently, the SMATRA will reject the request to enter neutral mode for one hour. Disconnecting the battery or other manipulation cannot reduce this time. After connecting the battery the timer starts again for one hour.



# BE-494

# Body Electrical System

### NOTICE

- Neutralizing setting condition
  - In case of PCM(ECM) status "Learnt" regardless of user password "Virgin or Learnt"
  - Input correct PIN code by scanner.
  - Neutralizing meaning .
    - : PIN code (6) & user password (4) deletion.
    - : Locking of ECM (except key teaching permission)

- Neutralizing meaning:
  - PIN Code(6) & User P/Word(4) deletion
  - Locking of EMS(except Key Learning permission)

| Function | Engine Running |           |                | Learning |               |
|----------|----------------|-----------|----------------|----------|---------------|
|          | Learnt Key     | Limp home | Twice Ignition | Key      | User Password |
| EMS      | No             | No        | No             | Yes      | No            |

SFDBE8407L

### Select System

|        |      |     |        |         |
|--------|------|-----|--------|---------|
| ENGINE | A/T  | ESP | AIRBAG | AIR/CON |
| AHLS   | IMMO | PIC | TPMS   | BCM     |
| CODE   |      |     |        |         |

### Selected

**IMMO**

Immobilizer(IMMO)

SYFBE0312L



# Immobilizer System

# BE-495

ID Register

→ Password Teaching/Changing

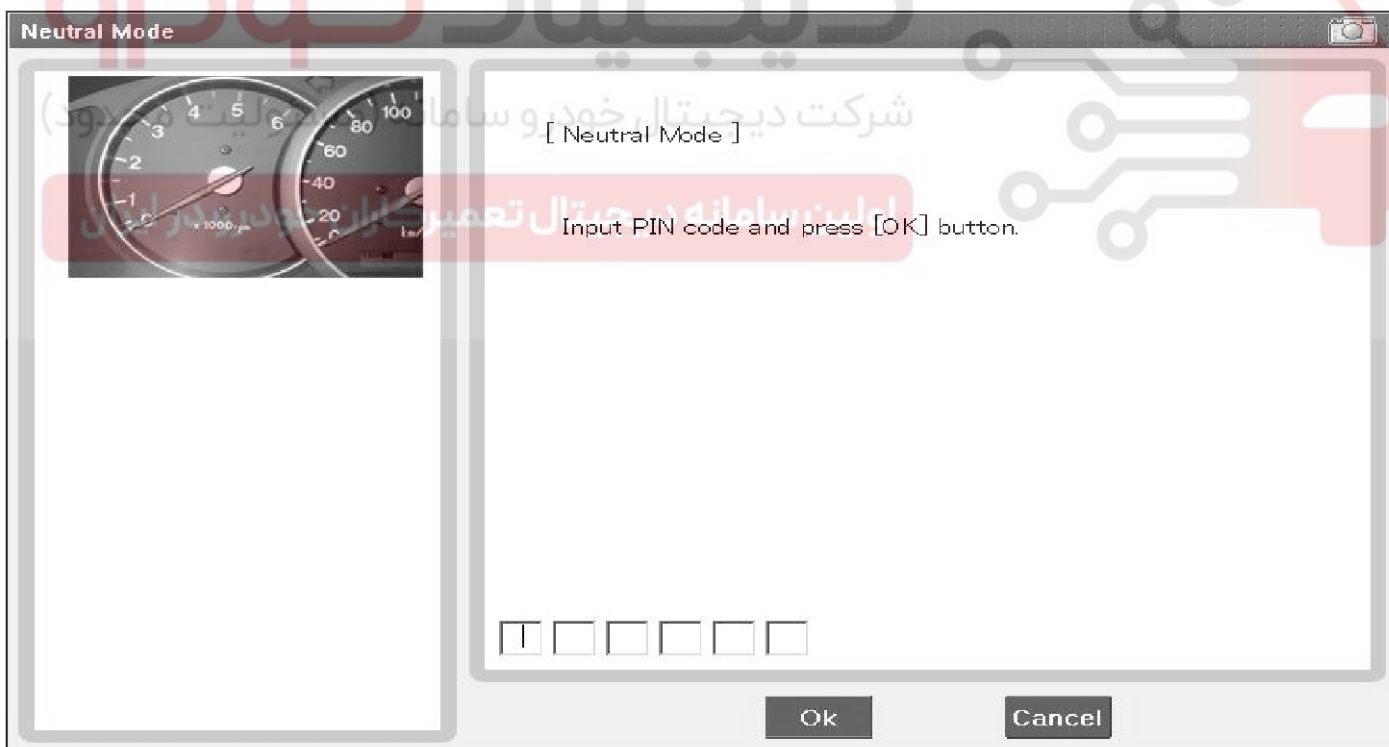
→ Neutral Mode

→ Limp Home Mode

→ Smatra Neutral Mode

→ Teaching

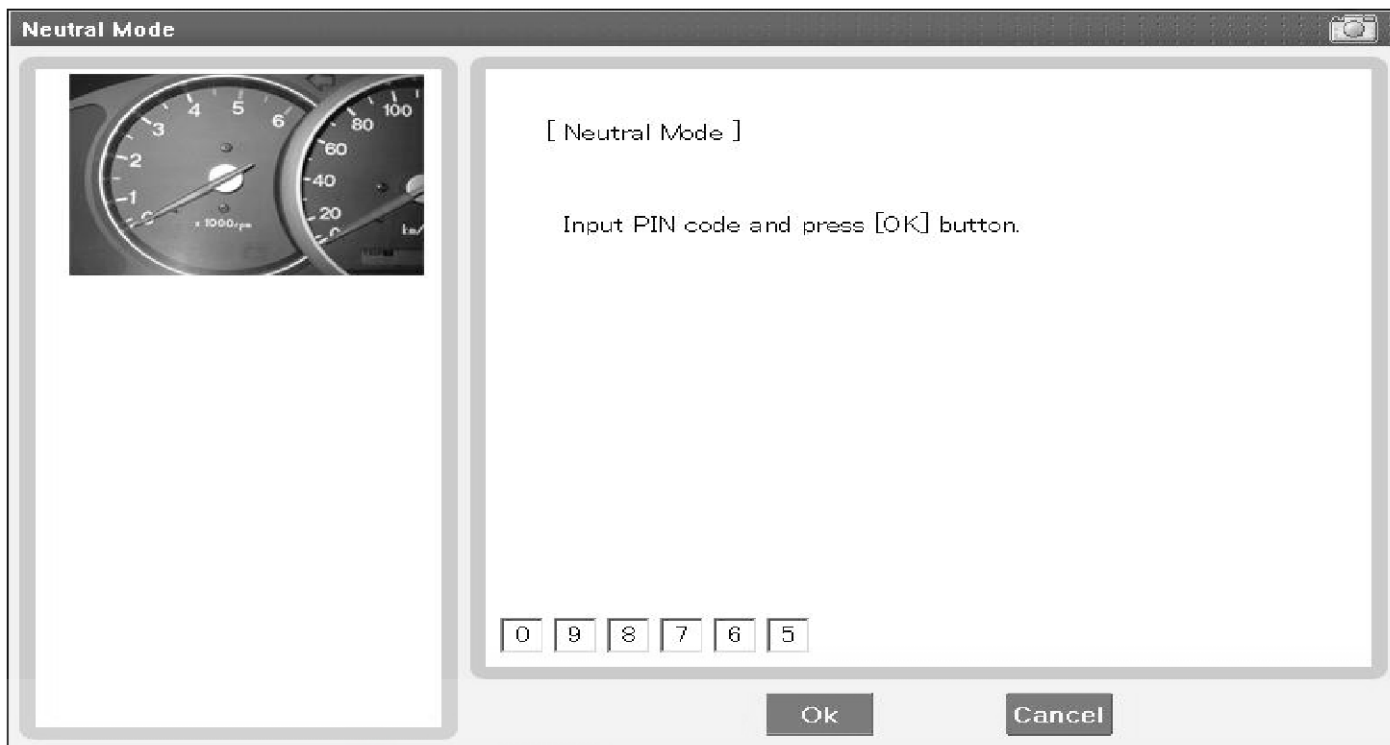
SBKBE9103N



SBKBE9104N

# BE-496

# Body Electrical System



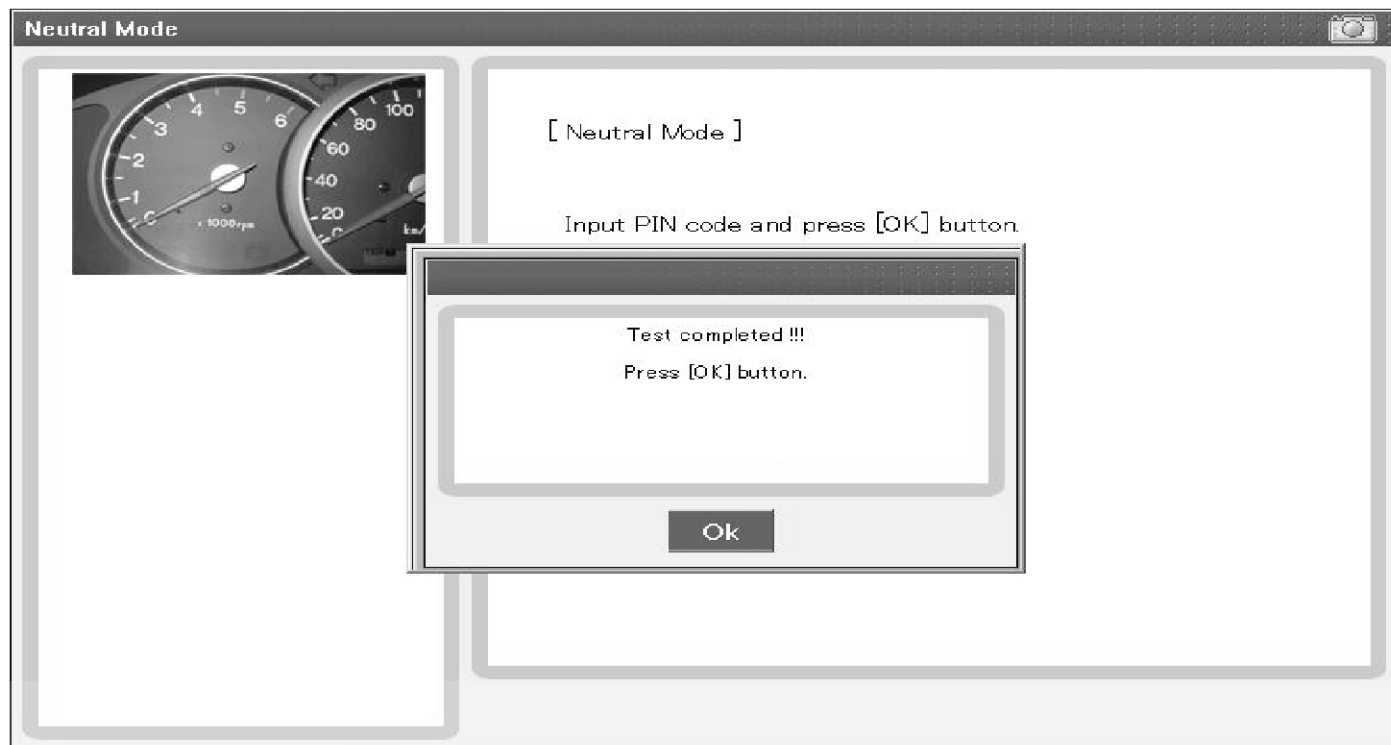
SBKBE9105N



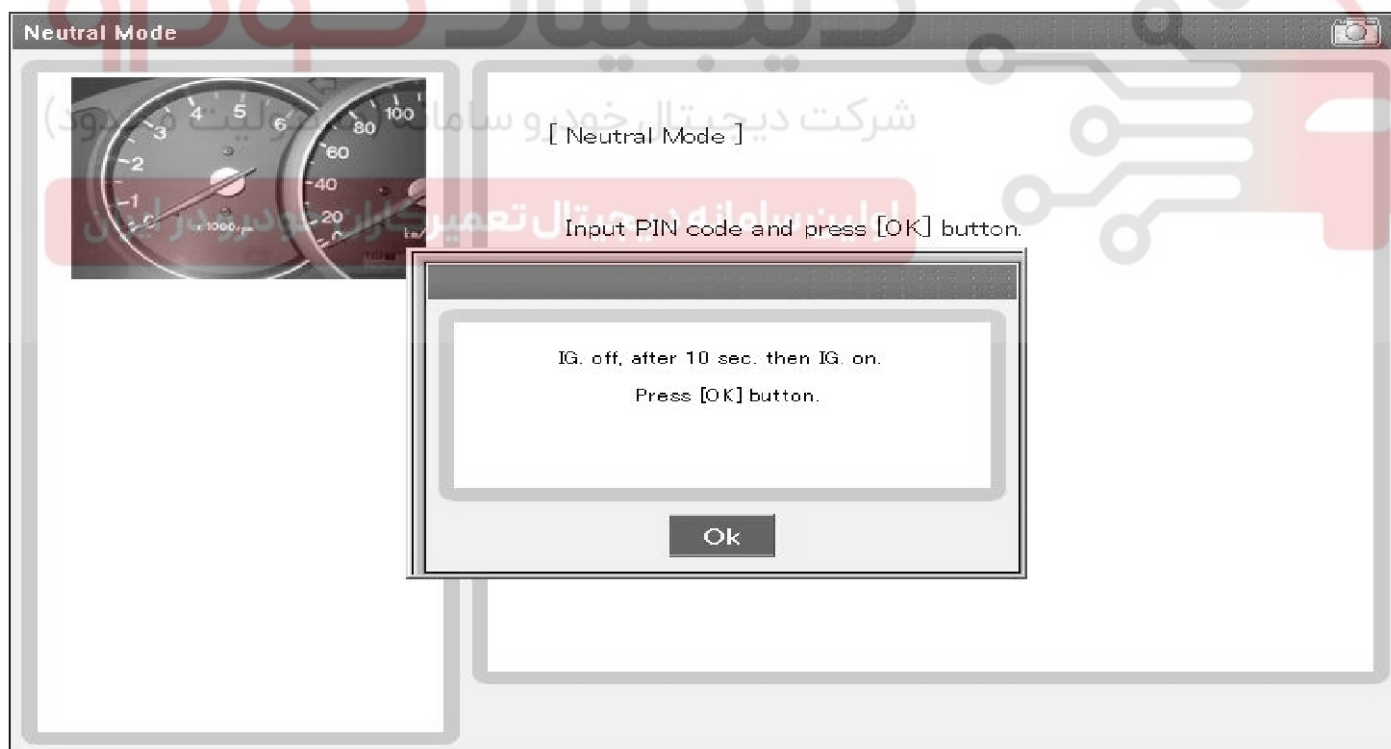
SBKBE9106N

# Immobilizer System

# BE-497



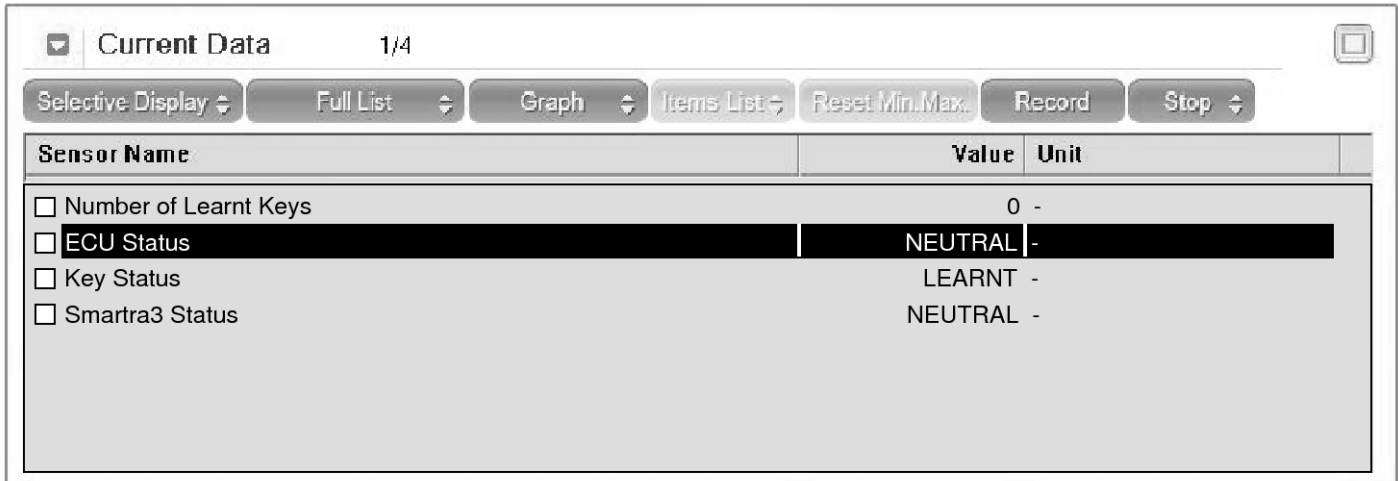
SBKBE9107N



SBKBE9108N

# BE-498

# Body Electrical System



SBKBE9109N

## Neutralizing Of SMARTRA

The EMS can be set to the status "neutral" by tester

Ignition key (regardless of key status) is inserted and after IGN ON. If receiving the correct vehicle password from GST, SMARTRA can be neutralized. The neutralization of SMARTRA is possible if DPN is same as the value inputted by GST.

In case that the SMARTRA status is neutral, the EMS keeps the lock state. And the start is not possible by "twice ignition".

In case of changing the vehicle password, new virgin transponder must be only used. And in case of virgin key, after Learning the key of vehicle password, it can be used.

If wrong vehicle specific data have been sent to SMATRA three times continuously or intermittently, the SMATRA will reject the request to enter neutral mode for one hour. Disconnecting the battery or other manipulation cannot reduce this time. After connecting the battery the timer starts again for one hour.

## NOTICE

- Neutralizing Setting condition :
  - In case of "SMARTRA status", "Learnt"
  - Input correct Pin code by tester
- Neutralizing meaning :
  - Vehicle password(DPN Code) & SEK Code deletion.
  - Permission of New DPN Learning.

| Function | Engine Running |                  |                | Learning |               |
|----------|----------------|------------------|----------------|----------|---------------|
|          | Learnt Key     | Limp home        | Twice Ignition | Key      | User Password |
| SMARTRA  | No             | Yes (EMS learnt) | No             | Yes      | No            |

SFDBE8408L

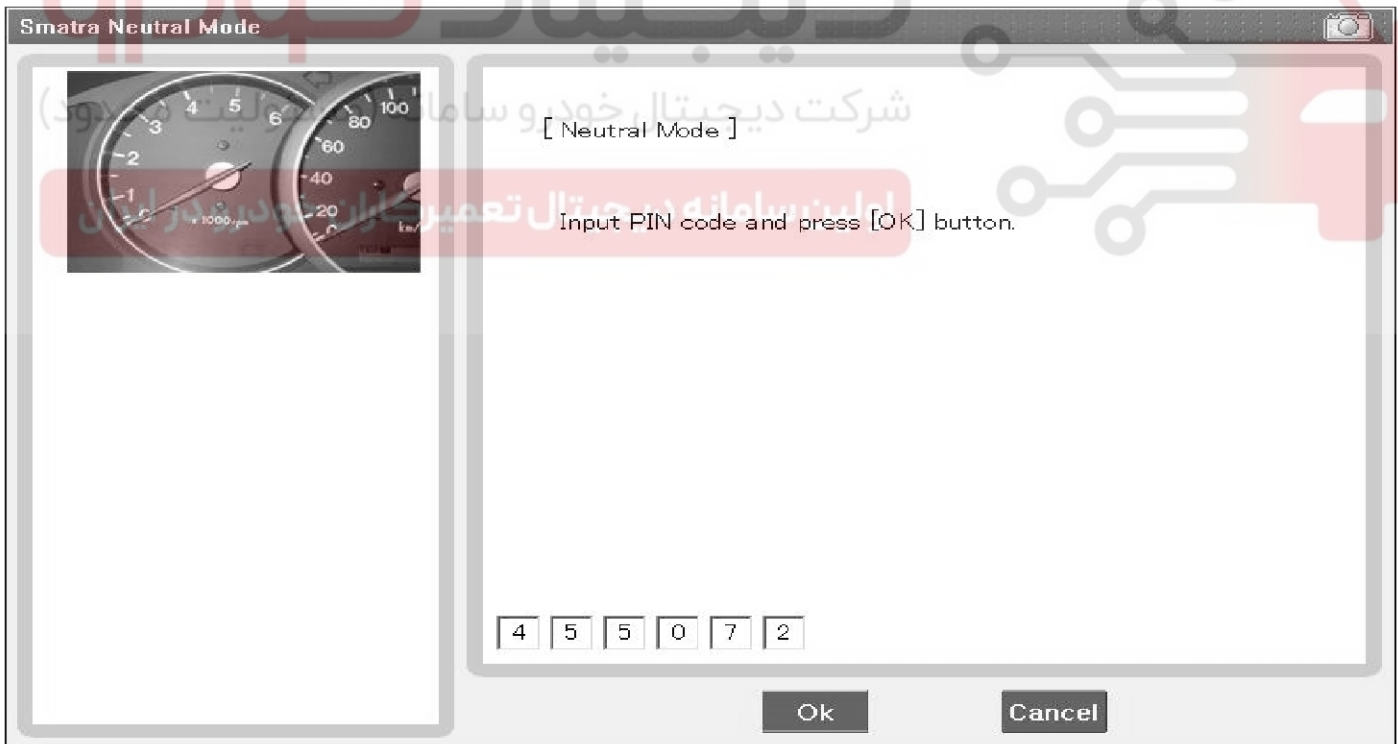
# Immobilizer System

# BE-499

ID Register

- Password Teaching/Changing
- Neutral Mode
- Limp Home Mode
- Smatra Neutral Mode
- Teaching

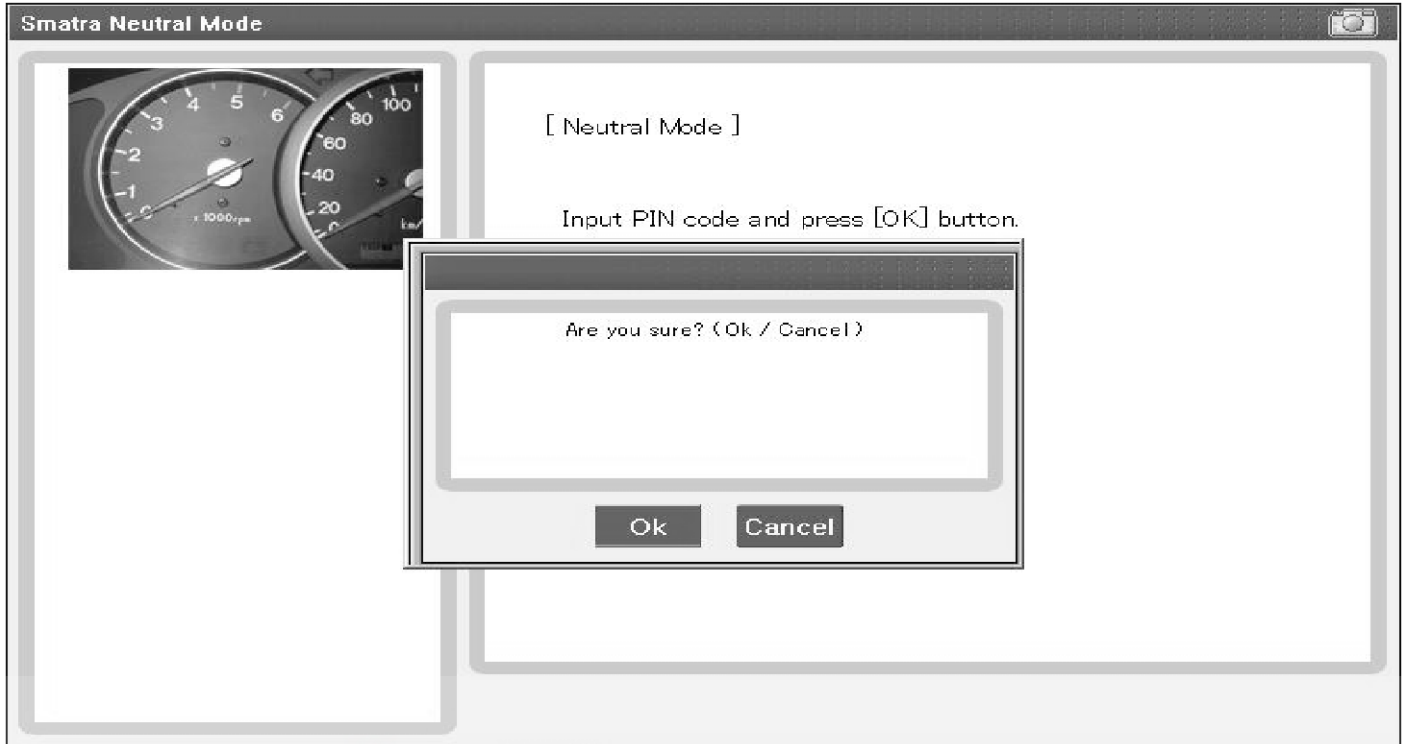
SBKBE9151N



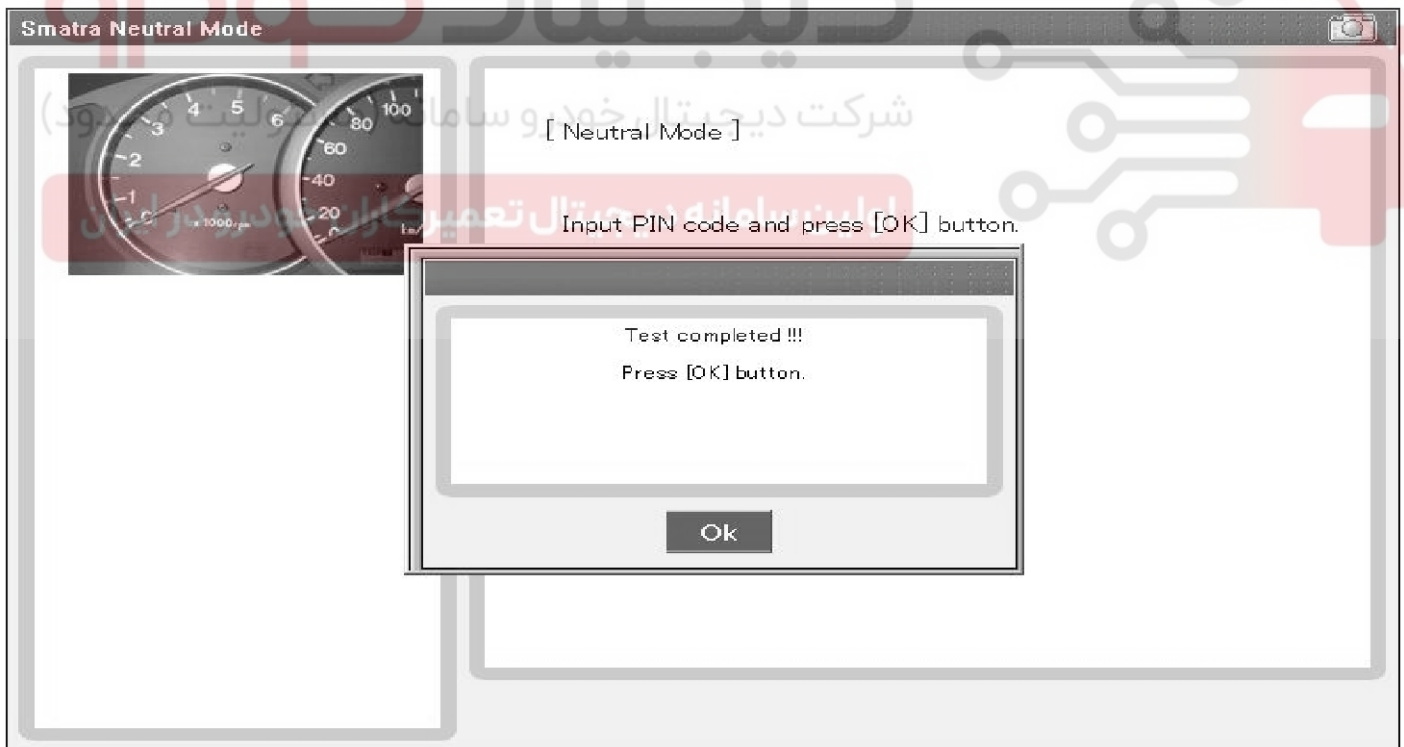
SBKBE9110N

# BE-500

# Body Electrical System



SBKBE9111N



SBKBE9112N

# Immobilizer System

# BE-501



SBKBE9113N



SBKBE9152N



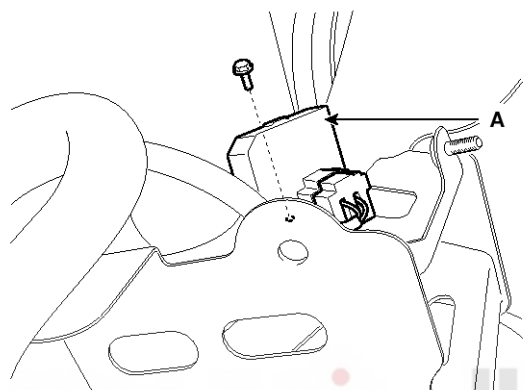
## BE-502

## Body Electrical System

### Immobilizer Control Unit

#### Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel.  
(Refer to the BD group - "Crash pad")
3. Disconnect the 5P connector of the SMARTRA unit and then remove the SMARTRA unit (A) after loosening the bolt.



SVGBE0377D

#### Installation

1. Install the immobilizer control unit after connecting the unit connector.
2. Install the crash pad lower panel.



دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

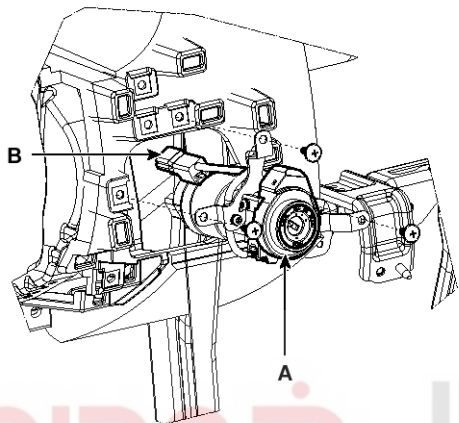
# Immobilizer System

**BE-503**

## Antenna Coil

### Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel.  
(Refer to the BD group - "Crash pad")
3. Disconnect the 6P connector (B) of the coil antenna and then remove the coil antenna (A) after loosening the screw.



SVGBE0217D

### Installation

1. Install the coil antenna and connect the 6P connector.
2. Install the crash pad lower panel.

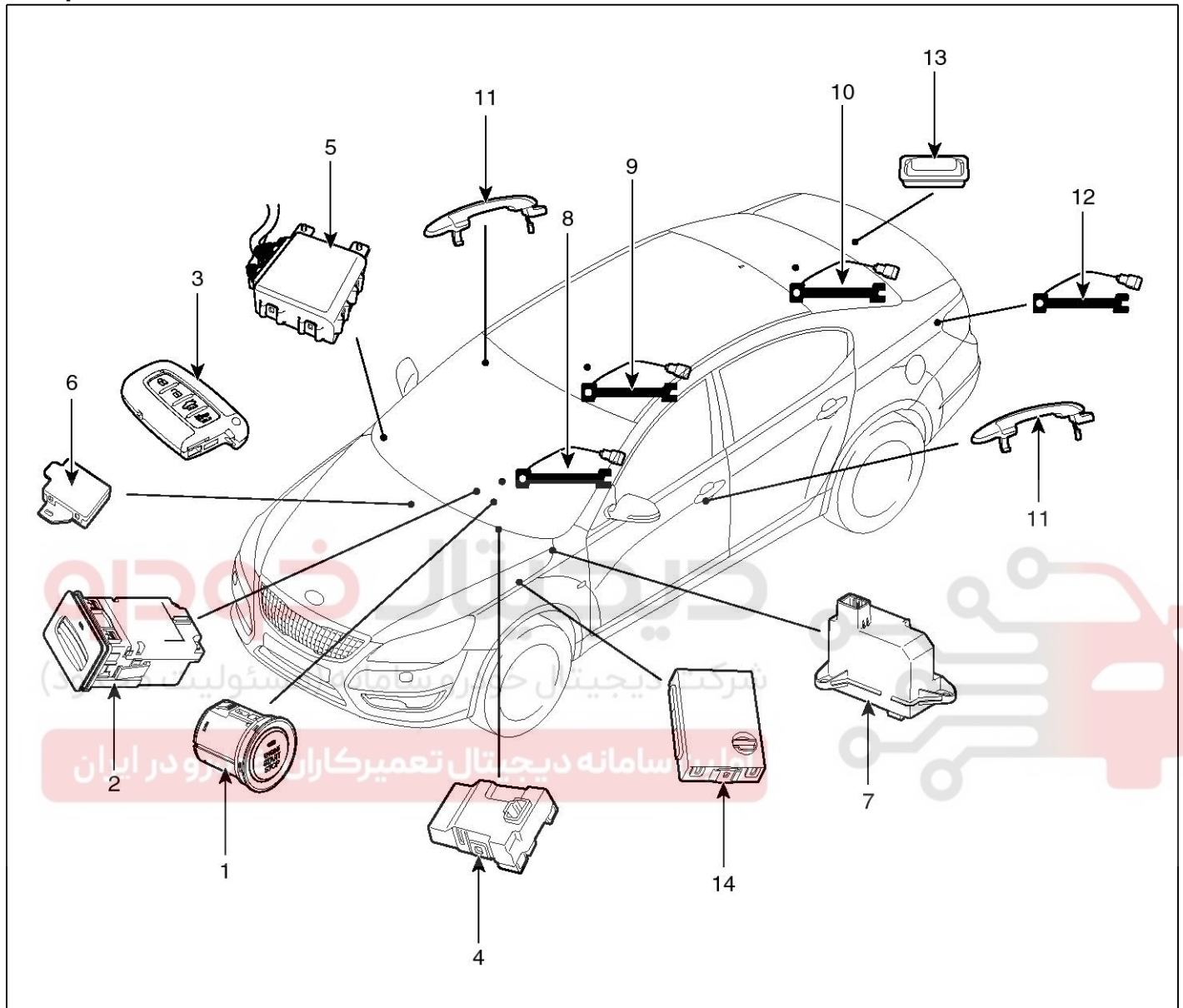


# BE-504

# Body Electrical System

## Button Engine Start System

### Component Location



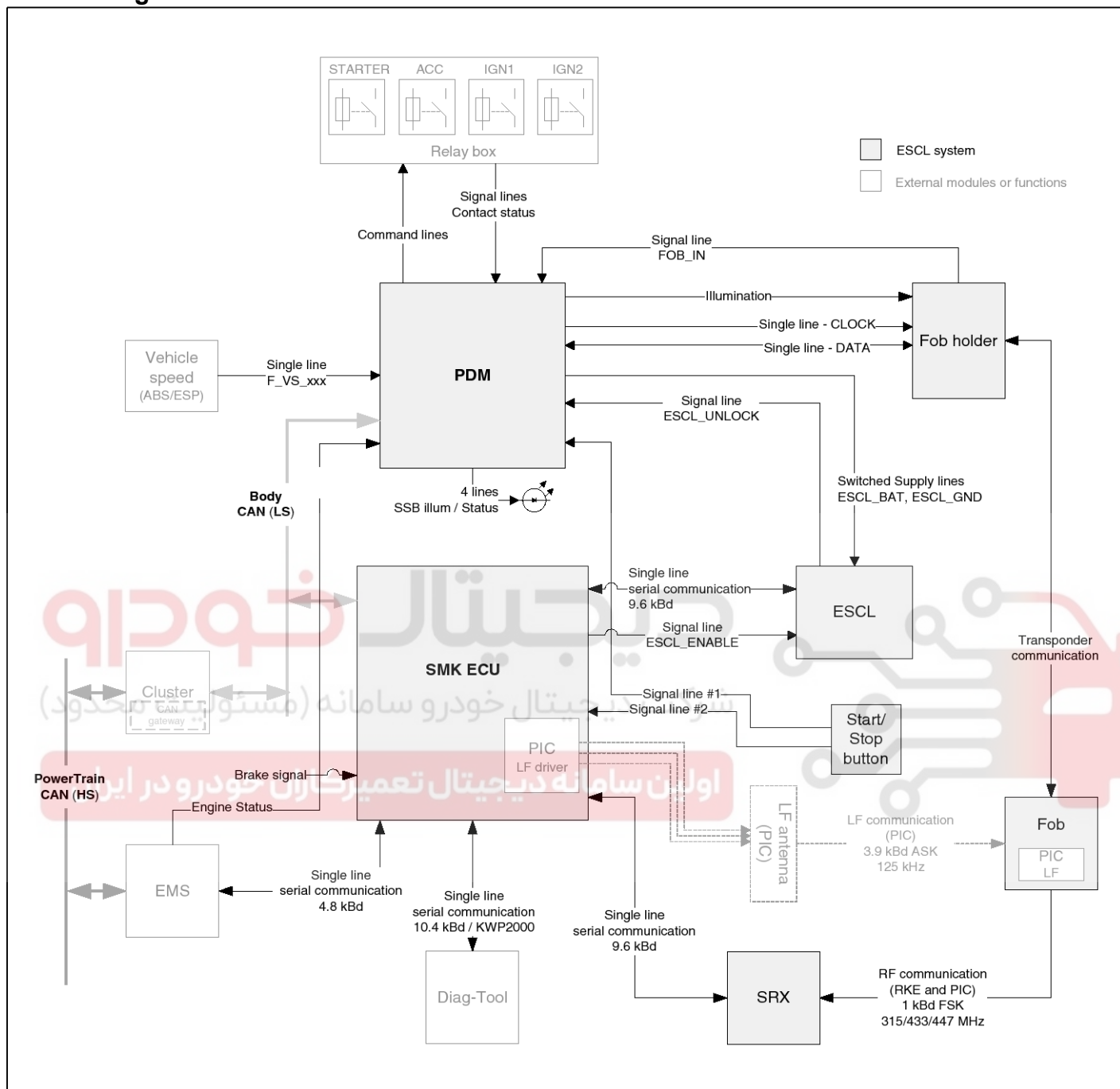
SVGBE0180D

- |                                          |                                                   |
|------------------------------------------|---------------------------------------------------|
| 1. Start Stop Button(SSB)                | 8. Interior antenna 1                             |
| 2. FOB key holder                        | 9. Interior antenna 2                             |
| 3. FOB key                               | 10. Trunk antenna                                 |
| 4. PDM(Power Distribution Module)        | 11. Door handle & door antenna                    |
| 5. Smart key unit                        | 12. Bumper antenna                                |
| 6. RF receiver                           | 13. Trunk lid open switch                         |
| 7. ESCL(Electrical Steering Column Lock) | 14. IPM (Intelligent intergrated Platform Module) |

# Button Engine Start System

# BE-505

## Circuit Diagram



SVGBE0360L

## BE-506

## Body Electrical System

### Description

#### System Overview

The System offers the following features:

- Human machine interface through a 1-stage button, for terminal switching and engine start.
- Control of external relays for ACC / IGN1 / IGN2 terminal switching and STARTER, without use of mechanical ignition switch.
- Steering column locking with an ESCL device; Monitoring of the vehicle status to insure safe activation of the ESCL.
- Indication of vehicle status through LED or explicit messages on display.
- Immobilizer function by LF transponder communication between fob and fob holder.
- Redundant architecture for high system dependability .
- Interface with Low Speed CAN vehicle communication network.
- Interface with LIN vehicle communication network depending on platform.

The RKE and SMART KEY functions are not considered part of this Button Engine Start system and are specified in separated system.

#### System Main Function

- Steering column locking/unlocking with ESCL.
- Switching of ACC / IGN1 / IGN2 terminals.
- Control of the STARTER relay BAT line (high side) based on communication with EMS ECU.
- Management of the Immobilizer function.
- Management of BES warning function.

#### Button Engine Start System

The Button Start System allows the driver to operate the vehicle by simply pressing a button (called as SSB) instead of using a standard mechanical key. It also manages the locking and the unlocking of the steering column (called as ESCL) without any specific actions by the driver.

If the driver press the SSB while prerequisites on brakes, fob authentication and transmission status are satisfied, the BES System will proceed with the locking/unlocking of the steering column, the control of the terminal, and the cranking of the engine.

The driver can release the SSB as soon as this sequence initiated. After positive response from immobilizer interrogation, the system will activate the starter motor and communicate with the EMS to check the engine running status for starter release.

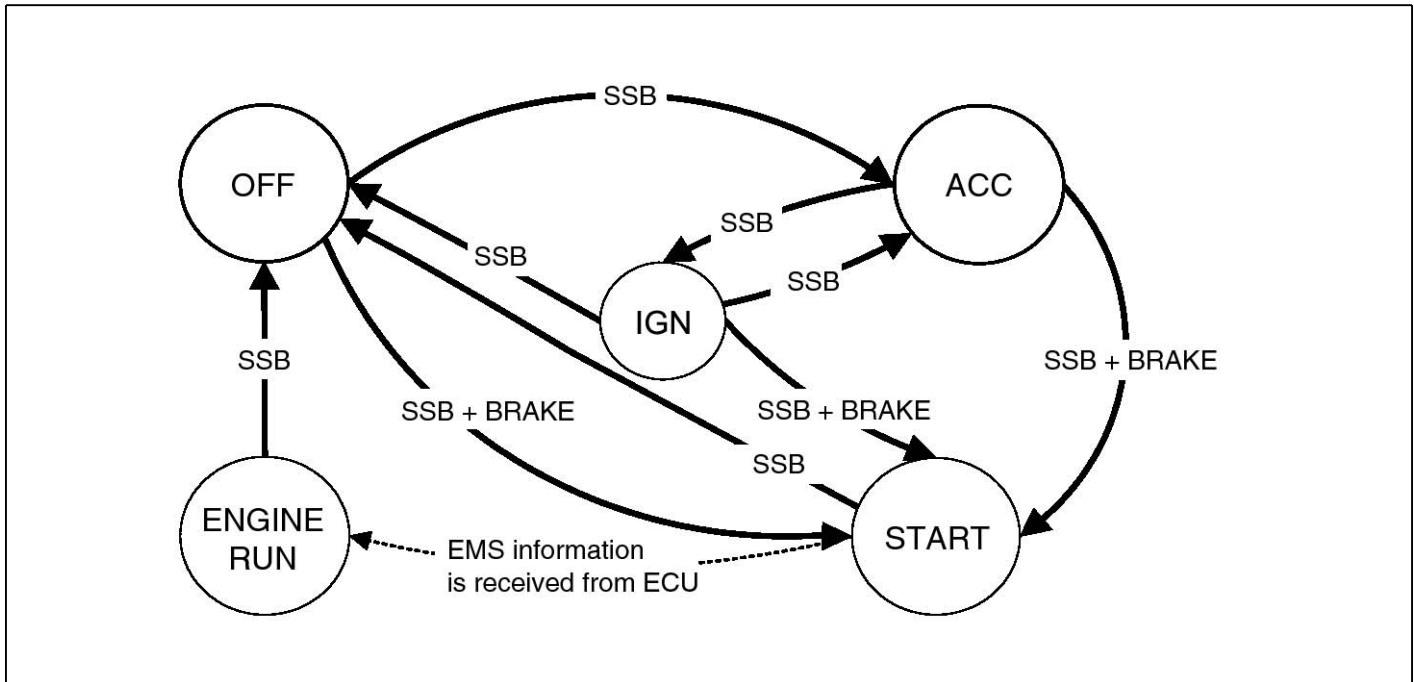
The driver will be able to stop the engine by a short push on the SSB if the vehicle is already in standstill. Emergency engine stop will be possible by a long press of the SSB or 3 consecutive presses in case the vehicle is in ENGINE RUNNING.

If the conditions for engine cranking are not satisfied while a push on the SSB is detected and a valid fob authenticated, the system will unlock the steering column and switch the terminals to IGN. Another push on the SSB will be necessary to start the engine.

In case of a vehicle equipped with SMART KEY system, fob authentication will not require any action from the driver. For limp home start or in case of vehicle without SMART KEY, the driver will have to insert the fob into the fob holder.

# Button Engine Start System

## BE-507



SVGBE0361L

- Control Ignition and engine ON/OFF by Sending signal to IPM and PDM.
- Display status by LED Lamp ON/OFF. (Amber or Blue)

### Indicator ON/OFF Condition At Ignition Key Off Condition

| No. | Character lamp                               | Conditions                          |
|-----|----------------------------------------------|-------------------------------------|
| 1   | Indicator Lamp ON                            | Door open, Tail lamp ON, ACC, IG ON |
| 2   | Indicator Lamp 30sec ON → Lamp OFF           | Door close, Tail lamp OFF, IG OFF   |
| 3   | Indicator Lamp OFF                           | Remote LOCK, Passive LOCK           |
| 4   | Rheostat at tail lamp ON (Illumination lamp) |                                     |

### Indicator ON/OFF Condition According To Ignition Key's Position

| No. | Ignition conditions | Start Button LED status             |
|-----|---------------------|-------------------------------------|
| 1   | IG OFF              | LED OFF                             |
| 2   | IG ACC              | Amber color LED ON                  |
| 3   | IG ON (Engine OFF)  | Blue color LED ON                   |
| 4   | Cranking            | Maintain LED status before cranking |
| 5   | Engine running      | LED OFF                             |

# BE-508

# Body Electrical System

## The shift of Ignition Position

| IGN. Position | Shift Lever Position |              |          |            |              |                         |              |
|---------------|----------------------|--------------|----------|------------|--------------|-------------------------|--------------|
|               | P Position           |              |          | N Position |              | Other Position (D or R) |              |
|               | Push                 | Brake + Push | Over 1HR | Push       | Brake + Push | Push                    | Brake + Push |
| Off           |                      |              |          |            |              |                         |              |
| ACC.          |                      |              |          |            |              |                         |              |
| IG1 & 2       |                      |              |          |            |              |                         |              |
| Start         |                      |              |          |            |              |                         |              |

- Transfer possibility, after Smart key certification
- Transfer possibility without Smart key certification
- Transfer possibility without Smart key certification

**● Condition of stop engine while driving**

- Press 3 times button within 3 seconds.
- Press button more than 2 seconds

SBHBE9474L

### Wireless Communication

Electromagnetic waves are used to exchange information between the vehicle and the FOB. Two types of RKE Key can supplement the BES system:

- Non-smart key RKE
- SMART KEY FOB

Currently the BES system comprises with SMART KEY FOB always.

The transmitter, receiver and antennas required for the communication between the fob and the vehicle will differ depending on functionalities and regional areas.

The RKE and SMART KEY functions are in separated documents. Refer to Smart key system for more detailed information about SMART KEY function.



# Button Engine Start System

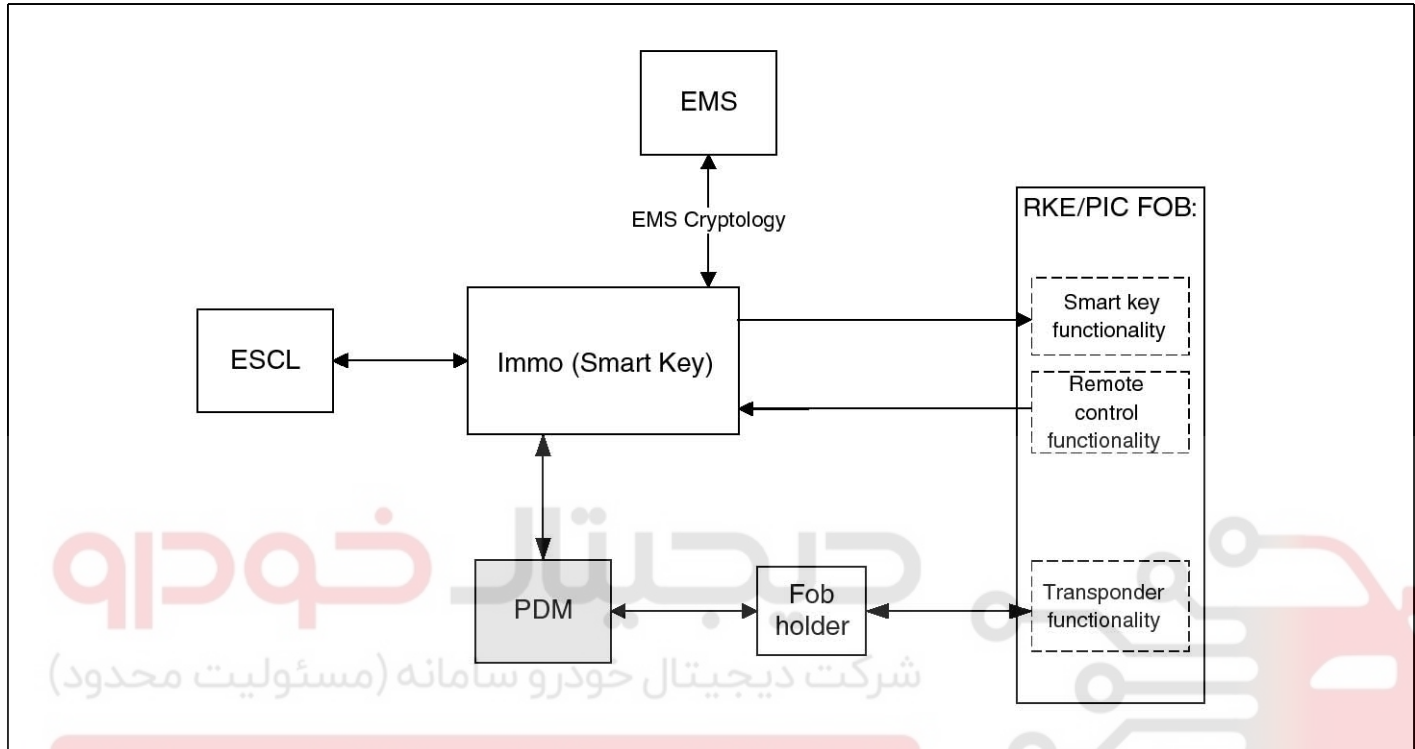
## BE-509

### Smart Key

The SMK manages all function related to:

- "Start Stop Button (SSB) monitoring",
- "Immobilizer communication" (with Engine Management System unit for immobilizer release),
- "ESCL control",

- "Authentication server" (Validity of Transponder and in case of Smart Key option Passive Fob authentication),
- "System consistency monitoring",
- "System diagnosis",
- Control of display message / warning buzzer.



SYFBE0246L

The unit behaves as Master role in the whole system.

In case of SMART KEY application, for example "Passive Access", "Passive Locking" and "Passive Authorization are integrated for ESCL/Terminal switching Operations".

It collects information about vehicle status from other modules (vehicle speed, alarm status, driver door open...), read the inputs (e.g. SSB, Lock Button and PARK position Switch), controls the outputs (e.g. exterior and interior antennas), and communicates with others devices via the CAN network as well as a single line interfaces.

The diagnosis and learning of the components of the BES System are also handled by the SMK.

## BE-510

## Body Electrical System

### PDM

The PDM manages the functions related to the "terminal control" by activating external relays for ACC, IGN1 and IGN2. This unit is also responsible for the control of the STARTER relay.

It controls also the power supply of the ESCL by switching the power and ground ESCL supply lines depending on vehicle status. The purpose of this function is to prevent the ESCL to be energized if ACC or IGN are switched on.

The PDM is also controlling the illumination of the SSB as well as the "system status indicator", which consists of 2 LEDs of different color. The illumination of the fob holder is also managed by the PDM.

The PDM reads the inputs (Engine fob\_in, vehicle speed, relays contact status, ESCL lock status), controls the outputs (Engine relay output drivers, ESCL power), and communicates with others devices via the CAN.

The internal architecture of the PDM is defined in a way that the control of the terminal and of the ESCL power is secured even in case of failure of one of the two microcontrollers, system inconsistency or interruption of communication on the CAN network.

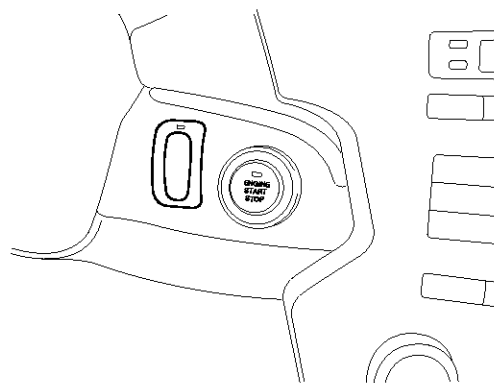
In case, failure of one of the two controllers, the remaining controller shall disable the starter relay and the ESCL power supply. The IGN1 and IGN2 terminals relays shall be maintained in the state memorized before the failure and the driver shall be able to switch those IGN terminals off by pressing the SSB with EMERGENCY\_STOP pressing sequence. However, engine restart will not be allowed. The state of the ACC relay will depend on the type of failure.

The PDM is diagnosed through the SMK MUT service, using the CAN network.

The main functions of the PDM are:

- Control of Terminal relays
- Monitoring of the Vehicle speed received from sensor or ABS/ESP ECU.
- Control of SSB LEDs (illumination, clamp state) and FOB HOLDER illumination.
- Control of ESCL power lines and monitoring of the ESCL unlock status
- Control of the base station located in fob holder through direct serial interface.
- System consistency monitoring to diagnose SMK failure and to switch to relevant limp home mode.
- Providing vehicle speed information

### Fob Holder



SVGBE0186D

This unit is used for transponder authentication. In case of a vehicle equipped with Smart key, this transponder authentication is necessary in case of failure of the passive fob authentication (Engine loss of RF or LF link with the fob).

The Fob holder module integrates a slot where to insert the fob. The fob is maintained in position with a push-push mechanical locking (not electrically driven) and a signal (FOB\_IN) is sent back to the PDM as soon as its insertion is detected.

The power supply of the fob holder is active only if a communication is initiated by the PDM.

The insertion of the fob into the holder and the communication with the transponder should be possible regardless of the insertion direction of fob to the holder (buttons facing up or bottom).

A lighting device is also integrated for illumination of the Fob Holder and it is driven directly by the PDM,

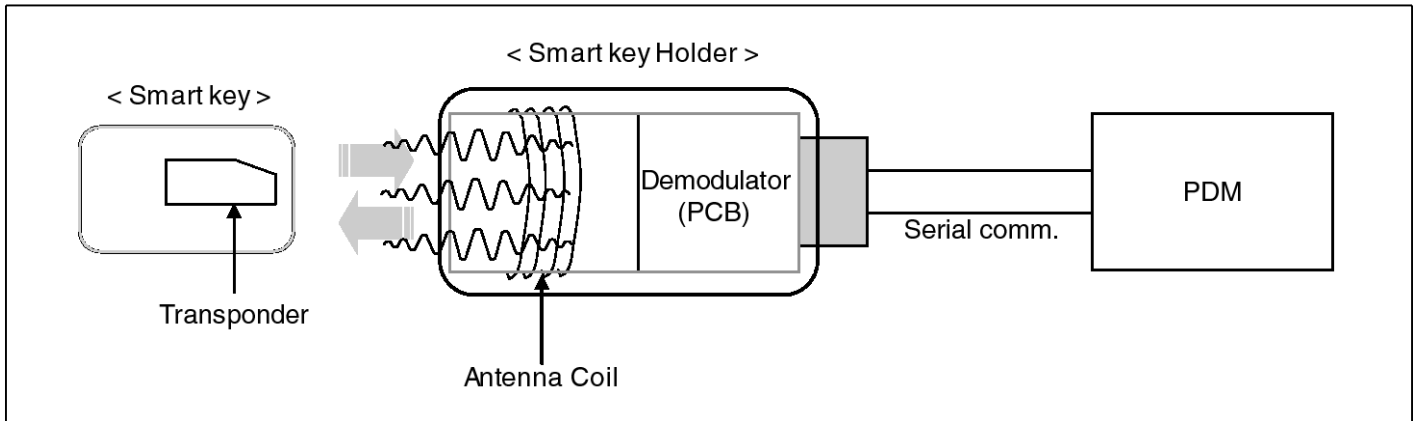
The main functions of the Fob holder are:

- Transponder base station
- Fob mechanical lock
- Illumination

# Button Engine Start System

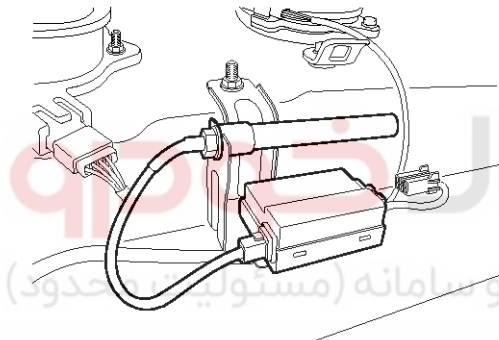
## BE-511

### Transponder



SHMBE9005L

### External Receiver(SRX)



SVGBE0128D

The data transmitted by the RKE or Smart key Fob is received by an external RF receiver called as SRX. This receiver will be same as that one for the SMK applications, with respect to electronics, housing, connector and software.

This receiver is connected to the SMK via a serial communication line.

### Terminal And Starter Relays

Relays will be used to switch the terminals ACC / IGN1 / IGN2. Those normally-open relays will be driven by the PDM and located either in the passenger or engine compartment depending on the vehicle architecture.

Only one relay coil is connected to the terminal outputs of the PDM.

Those relays should integrate a resistor connected in parallel to the coil in order to reduce the transients during commutation.

## BE-512

## Body Electrical System

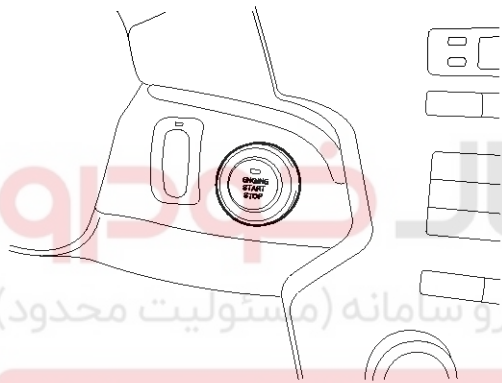
### Start/Stop Button(SSB)

A single stage push button is used for the driver to operate the vehicle. Pressing this button allows:

- To activate the power modes 'Off', 'Accessory', 'Ignition' and 'Start' by switching the corresponding terminals
- To start the engine
- To stop the engine

The contact will be insured by a micro-switch and a backlighting is provided to highlight the marking of the button whenever necessary.

Two (2) LED colors are located in the center of the button to display of the status of the system. Another illumination LED is also integrated into the SSB for the lighting of the "Engine Start/Stop" characters.

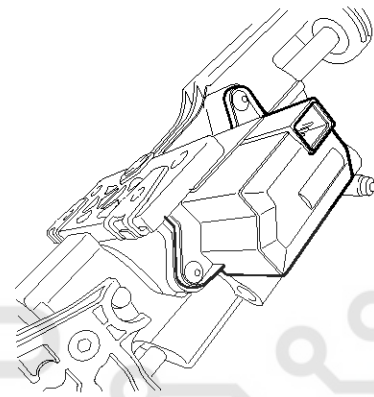


SVGBE0187D

### Electronic Steering Column Lock (ESCL)

The ESCL is needed to lock the steering column in order to prevent unauthorized usage of the vehicle. In order to achieve the required safety integrity level, the ESCL is controlled and monitored by 2 independent units, the SMK and the PDM. Such redundant architecture guarantees that the ESCL motor is supplied only during locking/unlocking operation and that it is disconnected from the battery and ground lines otherwise to avoid unexpected operation while the vehicle is in motion.

Data are exchanged between the ESCL and SMK through an encrypted serial communication interface.



SVGBE0188D

# Button Engine Start System

## BE-513

### BES System State Chart

#### System STATES in LEARNT MODE

In learnt mode, the BES System can be set in 6 different states, depending on the status of the terminals, ESCL and Engine status:

| System State      | Terminal Status | ESCL Status | Engine status                     |
|-------------------|-----------------|-------------|-----------------------------------|
| 1. OFF - Locked   | OFF             | Locked      | Stopped                           |
| 2. OFF - Unlocked | OFF             | Unlocked    | Stopped                           |
| 3. ACC            | ACC             | Unlocked    | Stopped                           |
| 4. IGN            | IGN1, IGN2, ACC | Unlocked    | Stopped                           |
| 5. Start          | IGN1, Start     | Unlocked    | Cranking                          |
| 6. IGN - Engine   | IGN1, IGN2, ACC | Unlocked    | Running<br>(means "self-running") |

Referring to the terminals, the system states described in the table above are same as those one found in a system based on a mechanical ignition switch. The one of distinction with Mechanical-Ignition-Switch based system is that the BES system allows specific transition from [OFF] to [START] without going through [ACC] and [IGN] states.

#### System STATES IN VIRGIN MODE

The BES System can be set in 5 different states (OFF LOCKED is not available in virgin mode), depending on the status of the terminals, ESCL and Engine status:

| System State      | Terminal Status                                                           | ESCL Status | Engine status                     |
|-------------------|---------------------------------------------------------------------------|-------------|-----------------------------------|
| 1. OFF - UNLOCKED | OFF                                                                       | Unlocked    | Stopped                           |
| 2. ACC            | ACC                                                                       | Unlocked    | Stopped                           |
| 3. IGN            | IGN1, IGN2, ACC                                                           | Unlocked    | Stopped                           |
| 4. Start          | IGN1, START with special pattern of activation see Chap 6.2.1 for details | Unlocked    | Cranking                          |
| 5. IGN - Engine   | IGN1, IGN2, ACC                                                           | Unlocked    | Running<br>(means "self-running") |

Referring to the terminals, the system states described in the table above are same as those one found in a system based on a mechanical ignition switch. The one of distinction with Mechanical-Ignition-Switch based system is that the BES system allows specific transition from [OFF] to [START] without going through [ACC] and [IGN] states.

# BE-514

# Body Electrical System

## Start/Stop Button

### Component



خودرو دیجیتال (مسئولیت محدود) شرکت دیجیتال خودرو سامانه

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

| Pin No. | Description                       | Pin No. | Description                     |
|---------|-----------------------------------|---------|---------------------------------|
| 1       | Start/Stop button switch1(PDM)    | 6       | Battery                         |
| 2       | Battery illumination              | 7       | Start/Stop button switch2(IPM)  |
| 3       | Start/Stop button LED Amber(PDM)  | 8       | Start/Stop button LED Blue(PDM) |
| 4       | Start/Stop button illum. GND(PDM) | 9       | Rheostat                        |
| 5       | Start/Stop button illum. power    | 10      | -                               |

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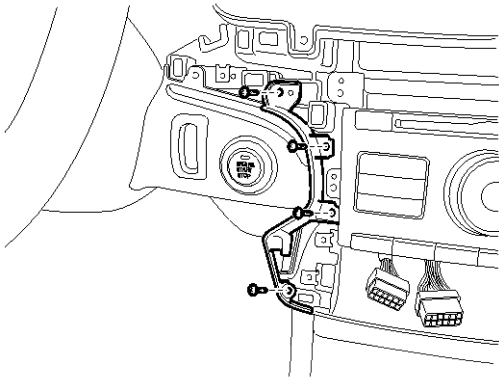


# Button Engine Start System

## BE-515

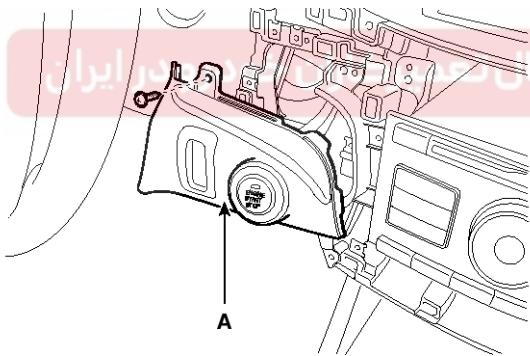
### Removal

1. Disconnect the negative(-) battery terminal.
2. Remove the crash pad lower panel.  
(Refer to the BD group - "Crash pad")
3. Remove the center fascia upper cover (A).  
(Refer to the BE group - "Audio")
4. Remove the screws from the center fascia side cover.



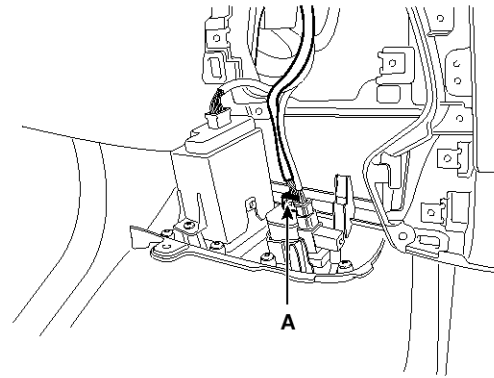
SVGBE0147D

5. Remove the key set bezel (A) after removing the screw.



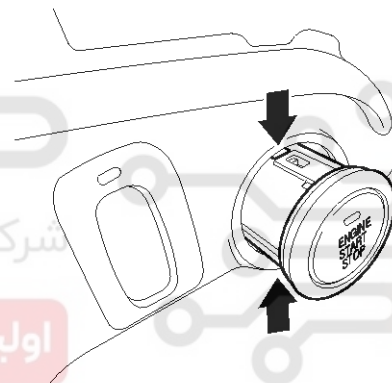
SVGBE0148D

6. Disconnect the start/stop button connector (A).



SVGBE0190D

7. Remove the start/stop button (A) by pushing the both sides of the hooks.



SVGBE0191D

### Installation

1. Install the start/stop button.
2. Install the key set bezel.
3. Install the center fascia upper cover.
4. Install the crash pad lower panel.

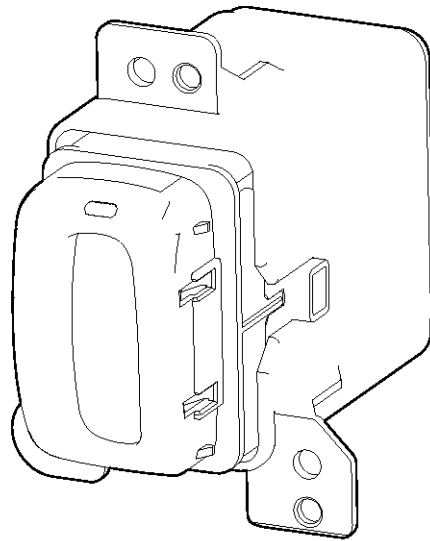



# BE-516

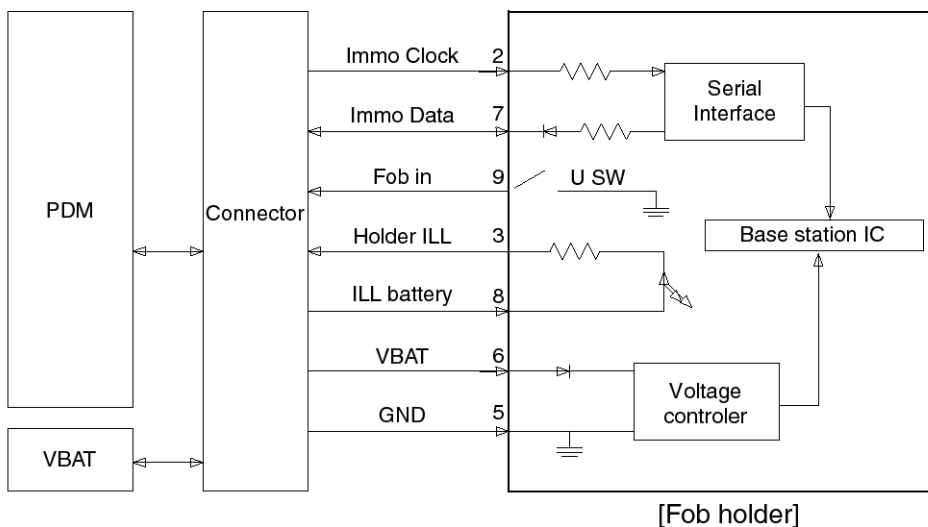
# Body Electrical System

## Fob Holder

### Components



| Connector (10 pins) |                          |  |                      |
|---------------------|--------------------------|------------------------------------------------------------------------------------|----------------------|
| No                  | Description              | No                                                                                 | Description          |
| 1                   | -                        | 6                                                                                  | Battery              |
| 2                   | Immobilizer clock        | 7                                                                                  | Immobilizer data     |
| 3                   | Holder illumination(PDM) | 8                                                                                  | Illumination battery |
| 4                   | -                        | 9                                                                                  | Fob in (PDM)         |
| 5                   | GND                      | 10                                                                                 | -                    |



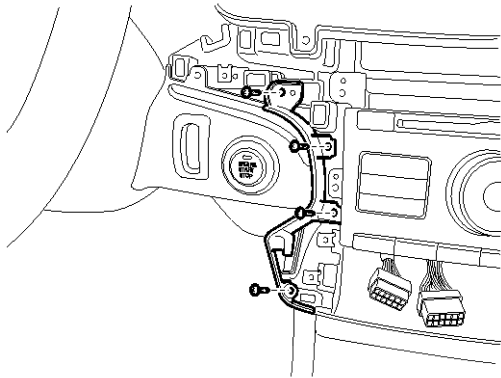
SVGBE0357L

# Button Engine Start System

## BE-517

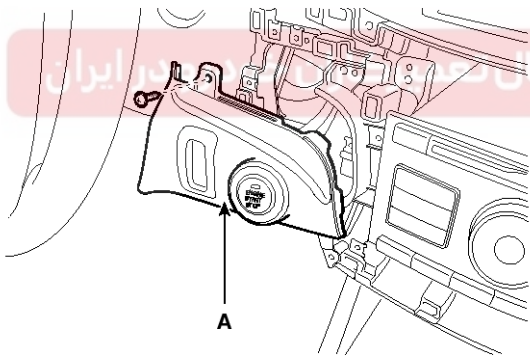
### Removal

1. Disconnect the negative(-) battery terminal.
2. Remove the crash pad lower panel.  
(Refer to the BD group - "Crash pad")
3. Remove the center fascia upper cover (A).  
(Refer to the BE group - "Audio")
4. Remove the screws from the center fascia side cover.



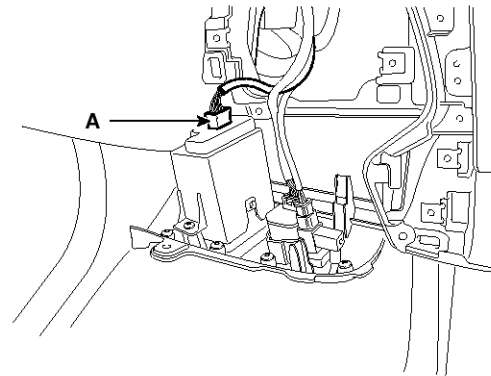
SVGBE0147D

5. Remove the key set bezel (A) after removing the screw.



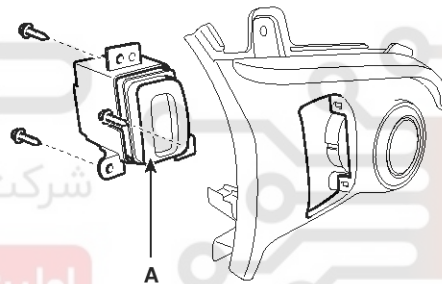
SVGBE0148D

6. Disconnect the fob holder connector (A).



SVGBE0193D

7. Remove the fob holder (A) after removing the screws (3EA).



SVGBE0194D

### Installation

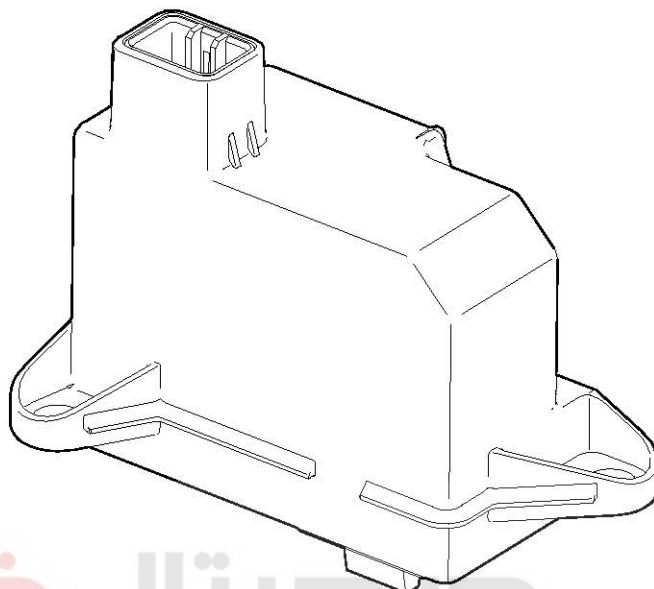
1. Install the fob holder.
2. Install the key set bezel.
3. Install the center fascia upper cover.
4. Install the crash pad lower panel.

## BE-518

## Body Electrical System

## ESCL(Electronic Steering Column Lock)

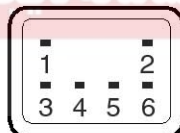
## Component



دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



Connector (6 pins)

| Pin No. | Description        |
|---------|--------------------|
| 1       | -                  |
| 2       | Ground             |
| 3       | Power(12V)         |
| 4       | ESCL-Enable (Lock) |
| 5       | ESCL- Unlock       |
| 6       | Data line          |

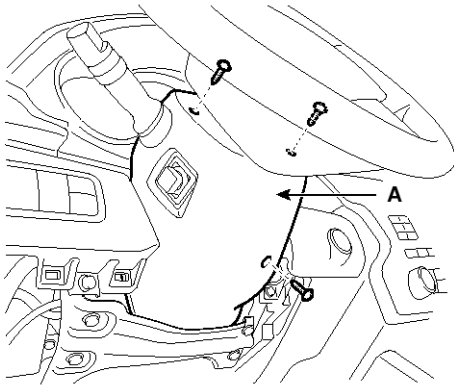
SVGBE0358L

# Button Engine Start System

## BE-519

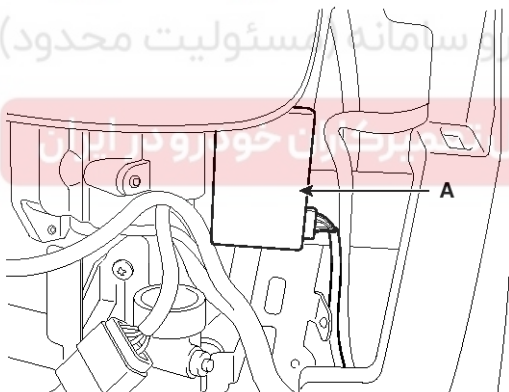
### Removal

1. Disconnect the negative(-) battery terminal.
2. Remove the crash pad lower panel.  
(Refer to the BD group - "Crash pad")
3. Remove the steering column upper and lower shrouds (A).



SVGBE0007D

4. Disconnect the electronic steering column lock connector (A).

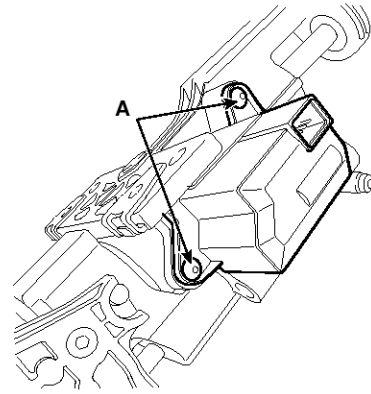


SVGB10134D

5. Remove the electronic steering column lock.  
(Refer to the ST group - "Steering column and shaft")

### ⚠ CAUTION

When remove the shear bolts (A), make a groove on head of the shear bolts by using a punch.



SVGBE0196D

### Installation

1. Install the electronic steering column lock (A).

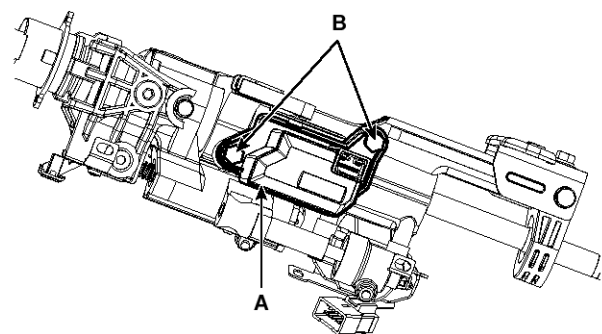
### ⚠ CAUTION

Do not reuse the shear bolts.

When installing the new shear bolts (B) to the electronic steering column lock, tighten the shear bolts until its head is cut off.

### Tightening torque :

7 ~ 13 N.m (0.7 ~ 1.3 kgf.m, 5 ~ 9.4 lb.ft)



SVGBE0197D

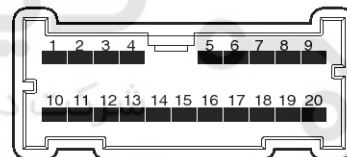
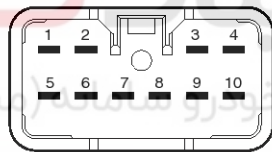
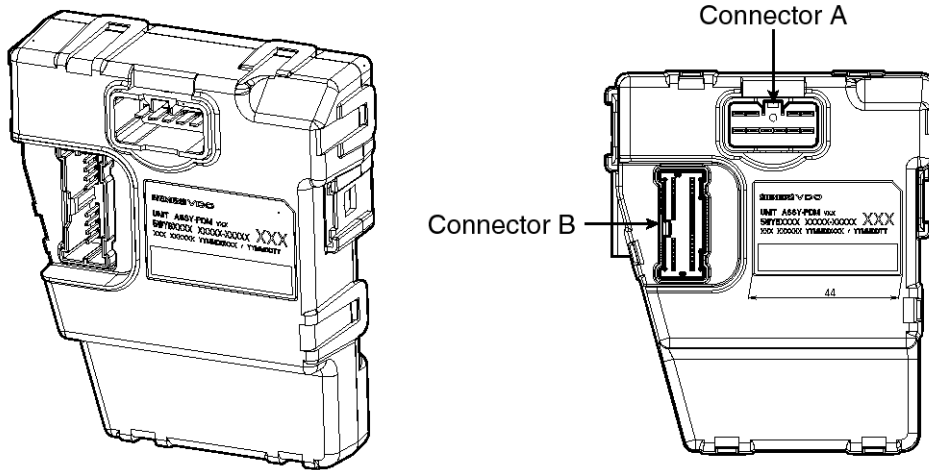
2. Install the steering column.
3. Install the crash pad lower panel.

BE-520

Body Electrical System

PDM(Power Distribution Module)

Component



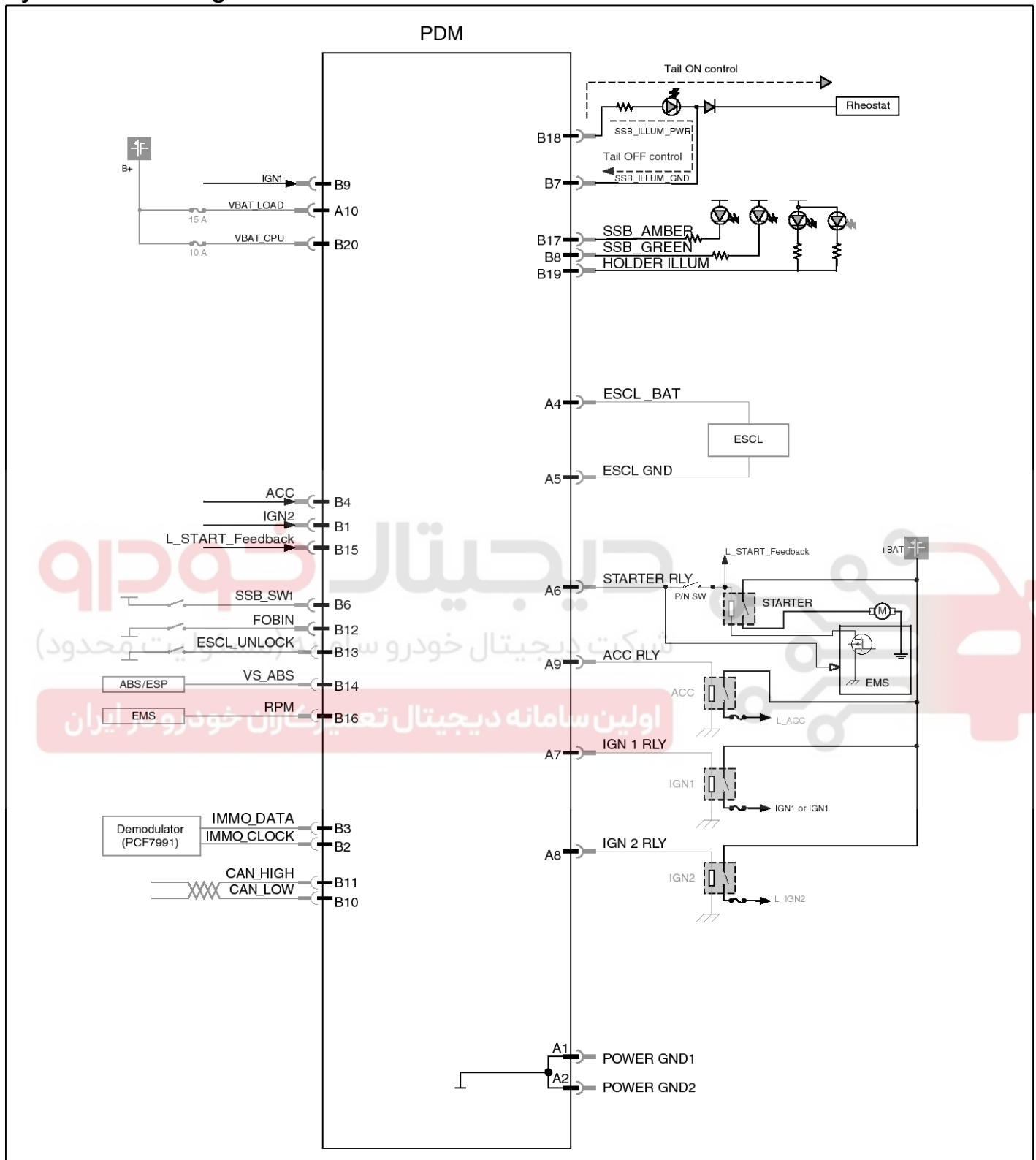
| Pin No. | Connector A (10 pin) | Connector B (20 pin)    |
|---------|----------------------|-------------------------|
| 1       | Power ground 1       | IGN2                    |
| 2       | Power ground 2       | Immobilizer clock       |
| 3       | -                    | Immobilizer data        |
| 4       | ESCL battery         | ACC                     |
| 5       | ESCL ground          | -                       |
| 6       | Starter relay        | SSB switch1             |
| 7       | IGN1 relay           | SSB illumination ground |
| 8       | IGN2 relay           | SSB LED green           |
| 9       | ACC relay            | IGN1                    |
| 10      | Battery load         | CAN L                   |
| 11      |                      | CAN H                   |
| 12      |                      | Fob in                  |
| 13      |                      | ESCL unlock             |
| 14      |                      | Vehicle speed           |
| 15      |                      | Start Feed back         |
| 16      |                      | RPM data (EMS)          |
| 17      |                      | SSB LED amber           |
| 18      |                      | SSB illumination power  |
| 19      |                      | Holder illumination     |
| 20      |                      | CPU battery             |

SVGBE0359L

# Button Engine Start System

# BE-521

## System Circuit Diagram



SYFBE0249L

# BE-522

# Body Electrical System

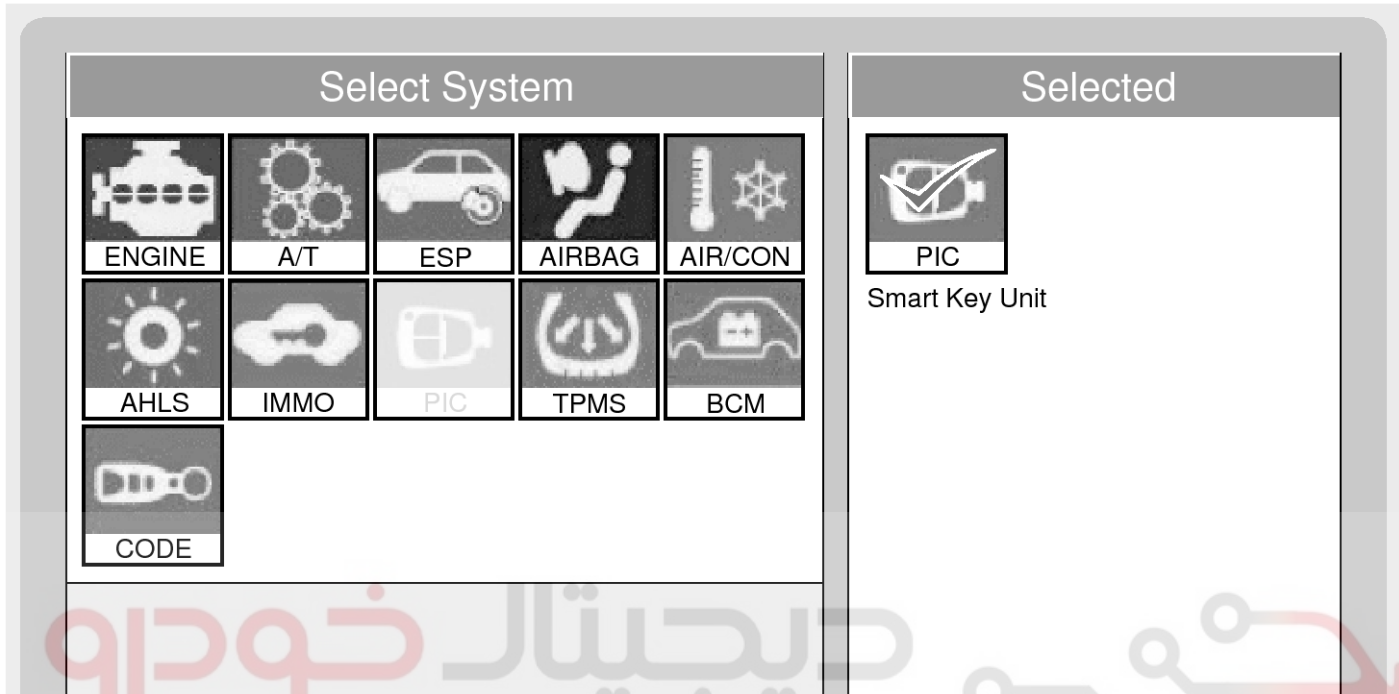
## Inspection

### PDM Diagnosis With GDS

1. It will be able to diagnose defects of Smart key with GDS quickly.

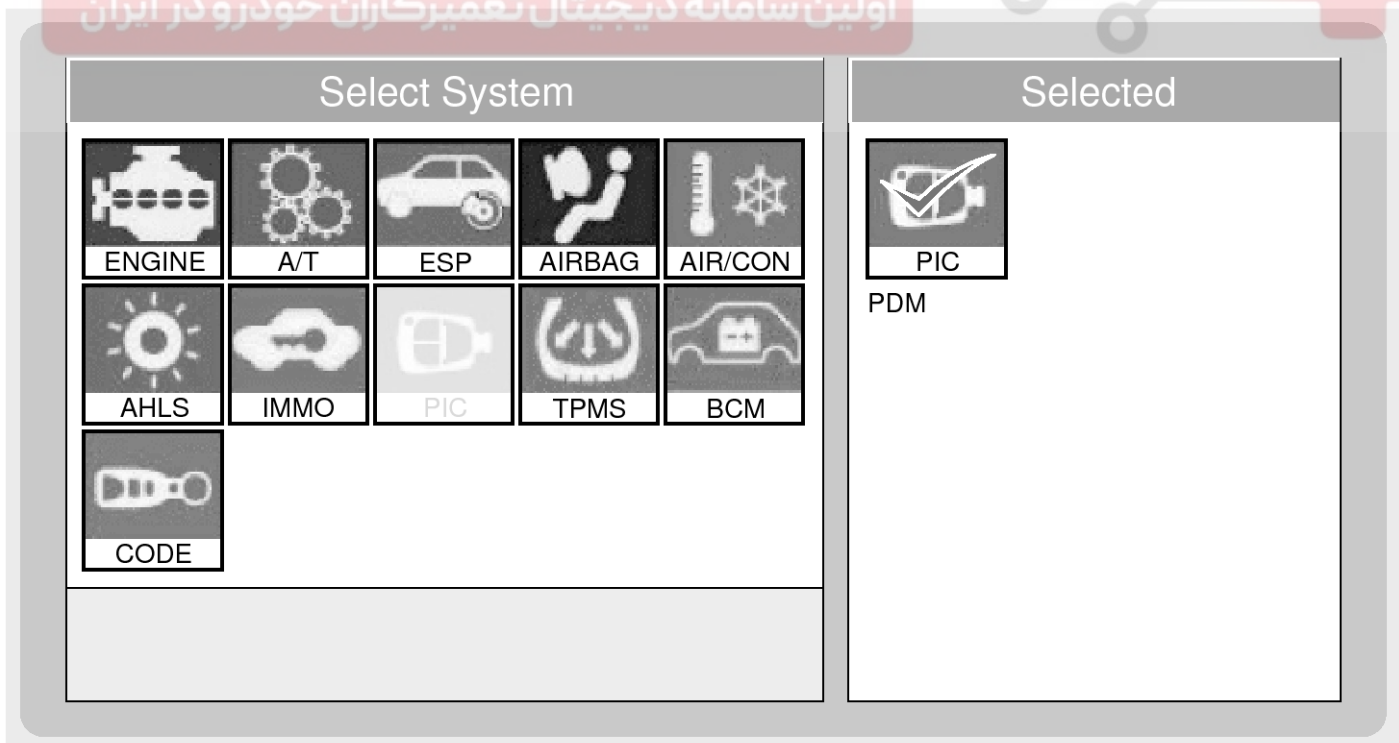
GDS can operate actuator forcefully, input/output value monitoring and self diagnosis.

2. Select model and "Smart key system (Button start)" menu if you want to check PDM.



SYFBE0309L

3. Select "PDM" in the manu.



SYFBE0311L



# Button Engine Start System

# BE-523

4. Select "Current Data", if you want to check current data of PDM.

It provides the input/output status of each module.

The screenshot shows a software interface titled "Current Data" with a sub-header "5/35". Below the title are several control buttons: "Selective Display", "Standard List", "Graph", "Items List", "Reset Min.Max.", "Record", and "Stop". The main area contains a table with two columns of sensor data.

| Sensor Name                       | Value | Unit | Sensor Name                        | Value | Unit |
|-----------------------------------|-------|------|------------------------------------|-------|------|
| Load battery voltage              | 12.2  | V    | ABS speed sensor (Main)            | 0     | MPH  |
| ABS speed sensor(SUB)             | 0     | MPH  | FOB In switch                      | ON    | -    |
| IGN2 input                        | ON    | -    | ESCL unlock input                  | OFF   | -    |
| IGN1 input                        | OFF   | -    | ACC relay L terminal               | OFF   | -    |
| Start stop switch                 | OFF   | -    | SSB illumination                   | OFF   | -    |
| FOB holder illumination out...    | OFF   | -    | SSB blue LED output                | OFF   | -    |
| SSB amber LED output              | OFF   | -    | ESCL ground output                 | OFF   | -    |
| ESCL battery output               | OFF   | -    | Starter relay output               | OFF   | -    |
| IGN2 relay output                 | OFF   | -    | IGN1 relay output                  | OFF   | -    |
| ACC relay output                  | OFF   | -    | CPU battery voltage                | 12.2  | V    |
| Start relay short circuit batt... | OK    | -    | IGN2 relay short circuit batt...   | NG    | -    |
| IGN1 relay short circuit batt...  | OK    | -    | ACC output short circuit batt...   | OK    | -    |
| IGN2 relay open                   | OK    | -    | IGN1 relay open                    | OK    | -    |
| ACC relay open                    | OK    | -    | Start output short circuit batt... | OK    | -    |
| IGN2 output short circuit bat...  | OK    | -    | IGN1 output short circuit bat...   | OK    | -    |
| ACC output short circuit batt...  | OK    | -    | Start output short circuit gro...  | OK    | -    |
| IGN2 output short circuit gro...  | OK    | -    | IGN1 output short circuit gro...   | OK    | -    |
| ACC output short circuit gro...   | OK    | -    |                                    |       |      |

SBKBE9136N

5. If you want to check PDM data operation forcefully, select "Actuation test".

The screenshot shows a software interface titled "Actuation Test". On the left, there is a list of "Test Items": SSB LED amber, SSB LED blue, FOB holder illumination, SSB illumination, ACC relay, IGN1 relay, IGN2 relay, and START relay. On the right, there are configuration fields: "Duration" set to "5 Sec", "Conditions" set to "IG OFF", and "Result" set to "Success". At the bottom right, there are "Start" and "Stop" buttons.

SBKBE9138N

## BE-524

## Body Electrical System

## Input/output Current Data

| NO | Description                    | Unit           |
|----|--------------------------------|----------------|
| 1  | Load Battery Voltage           | V              |
| 2  | Abs Speed Sensor(main)         | Km/h           |
| 3  | Start Stop Button SW           | OFF/ON         |
| 4  | ACC input                      | OFF/ON         |
| 5  | IGN1 Input                     | OFF/ON         |
| 6  | IGN2 Input                     | OFF/ON         |
| 7  | Fob In Switch                  | RELEASE/INSERT |
| 8  | Start Relay Monitoring Input   |                |
| 9  | SSB Amber LED Output           | OFF/ON         |
| 10 | SSB Blue LED Output            | OFF/ON         |
| 11 | Fob Holder Illumination Output | OFF/ON         |
| 12 | SSB Illumination Output        | OFF/ON         |
| 13 | ACC Relay Output               | OFF/ON         |
| 14 | IGN1 Relay Output              | OFF/ON         |
| 15 | IGN2 Relay Output              | OFF/ON         |
| 16 | Start Relay S1 Output          | OFF/ON         |
| 17 | ESCL Battery Output            | OFF/ON         |
| 18 | ESCL GND Output                | OFF/ON         |
| 19 | CPU Battery Voltage            | V              |
| 20 | Engine Speed                   | DATA*1.0       |
| 21 | ACC Relay SCB                  | OFF/ON         |
| 22 | IGN1 Relay SCB                 | OFF/ON         |
| 23 | IGN2 Relay SCB                 | OFF/ON         |
| 24 | Start Relay SCB                | OFF/ON         |
| 25 | SCC Relay Open                 | OFF/ON         |
| 26 | IGN1 Relay Open                | OFF/ON         |
| 27 | IGN2 Relay Open                | OFF/ON         |
| 28 | ACC Output SCB                 | OFF/ON         |
| 29 | IGN1 Output SCB                | OFF/ON         |
| 30 | IGN2 Output SCB                | OFF/ON         |
| 31 | Start Output SCB               | OFF/ON         |
| 32 | ACC Output SCG                 | OFF/ON         |
| 33 | IGN1 Output SCG                | OFF/ON         |
| 34 | IGN2 Output SCG                | OFF/ON         |

# Button Engine Start System

**BE-525**

| NO | Description      | Unit   |
|----|------------------|--------|
| 35 | Start Output SCG | OFF/ON |

**Actuation Test**

| No. | Description             |
|-----|-------------------------|
| 1   | SSB Ember LED           |
| 2   | SSB Blue LED            |
| 3   | Fob Holder Illumination |
| 4   | SSB Illumination        |
| 5   | ACC Output              |
| 6   | ING1 Output             |
| 7   | ING2 Output             |
| 8   | Start Output            |
| 9   | Perform ESCL Open Check |

# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



# BE-526

# Body Electrical System

## ESCL OPEN STATUS CHECK

1. Select the "ESCL open status check" menu if you want to check ESCL open.



SBKBE9139N

SBKBE9140N

# Button Engine Start System

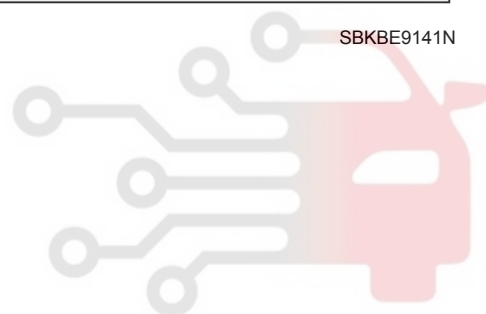
# BE-527



دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

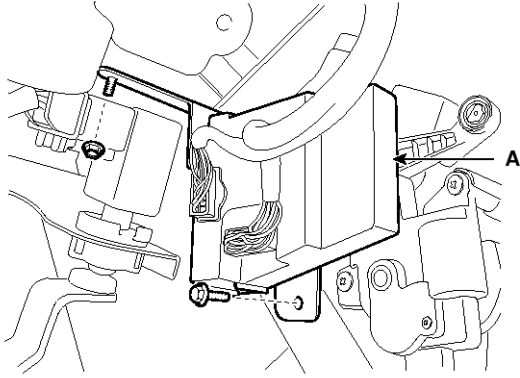


## BE-528

## Body Electrical System

### Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel.  
(Refer to the BD group - "Crash pad")
3. Remove the PDM (A) with bracket after loosening the mounting nut (1EA) and bolt (1EA).



SVGBE0198D

4. Remove the PDM from the bracket after disconnecting the connectors.

### Installation

1. Install the power distribution module.
2. Install the crash pad lower panel.



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# Front / Rear Parking Assist System

# BE-529

## Front / Rear Parking Assist System

### Front / Rear Parking Assist System Control Unit

#### Specifications

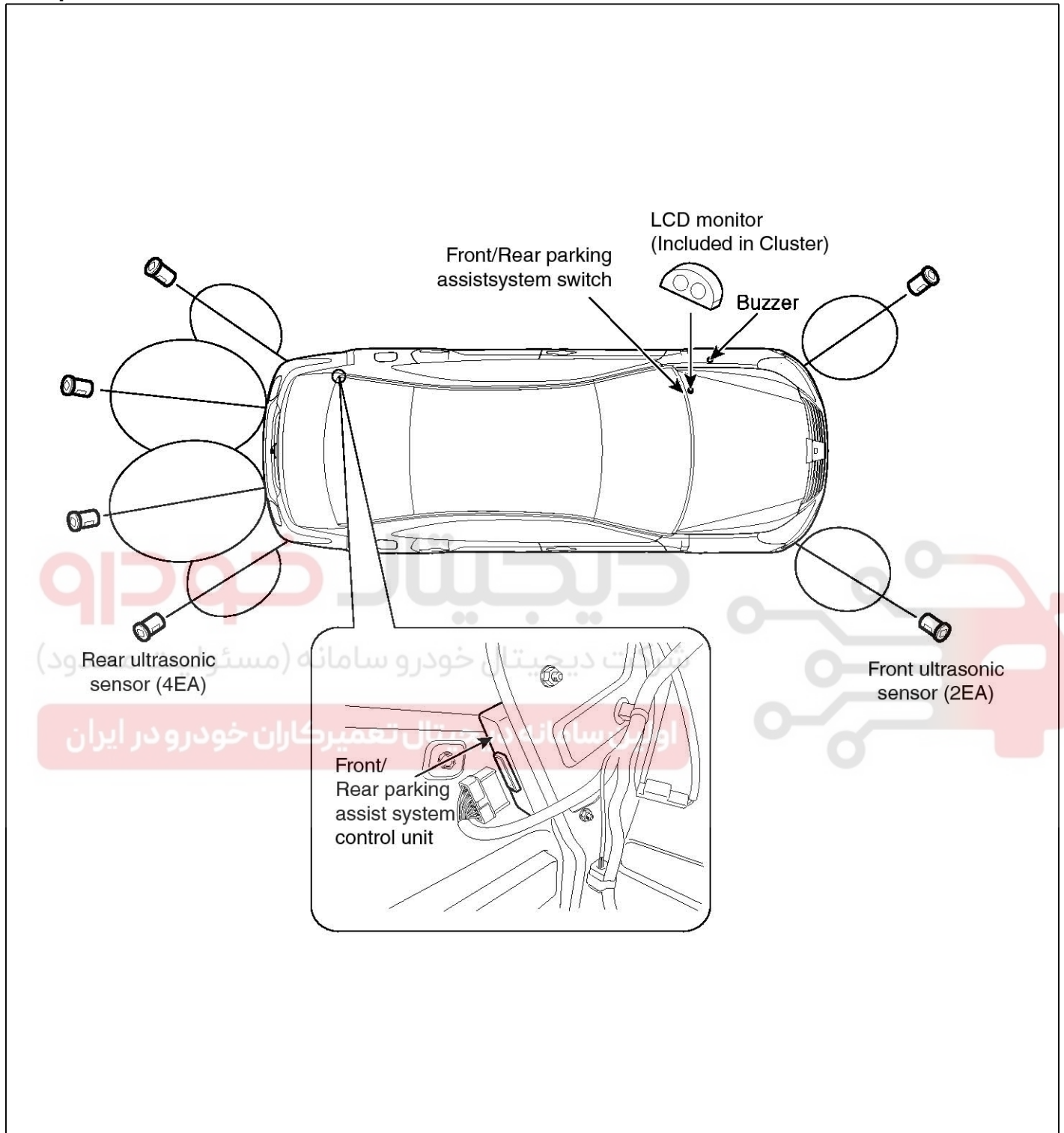
| Item                                    |                       | Specification                         |
|-----------------------------------------|-----------------------|---------------------------------------|
| Rear parking assist system control unit | Voltage rating        | DC 12V                                |
|                                         | Operation voltage     | DC 9 ~ 16 V                           |
|                                         | Operation temperature | -30 ~ + 80°C (-22 ~ 176°F)            |
|                                         | Operation current     | MAX 600 mA                            |
|                                         | Operation frequency   | Front : 48 ± 5 KHz, Rear : 40 ± 5 KHz |
|                                         | Detective method      | Direct and indirect detection         |
| Ultrasonic sensor                       | Voltage rating        | DC 8 V                                |
|                                         | Operation voltage     | DC 7 ~ 9 V                            |
|                                         | Operation current     | MAX 20 mA                             |
|                                         | Operation temperature | -30 ~ + 80°C (-22 ~ 176°F)            |
|                                         | Beam width (Front)    | Horizontal : 100°, Vertical : 40°     |
|                                         | Beam width (Rear)     | Horizontal : 110°, Vertical : 50°     |
|                                         | Operation frequency   | 48 ± 5 KHz                            |
|                                         | Number of sensors     | 6 (front : 2, rear : 4)               |
| Piezo buzzer                            | Voltage rating        | DC 12 V                               |
|                                         | Operation voltage     | DC 7.5 ~ 14.5 V                       |
|                                         | Operation temperature | -30 ~ + 80°C (-22 ~ 176°F)            |
|                                         | Operation temperature | -40 ~ + 85°C (-40 ~ 185°F)            |
|                                         | Operation current     | MAX 50 mA                             |
|                                         | Sound, tone           | Oscillation frequency : 2.0±0.4 KHz   |
| Sound level : over 80 ~ 93 dB           |                       |                                       |



# BE-530

# Body Electrical System

## Component Location

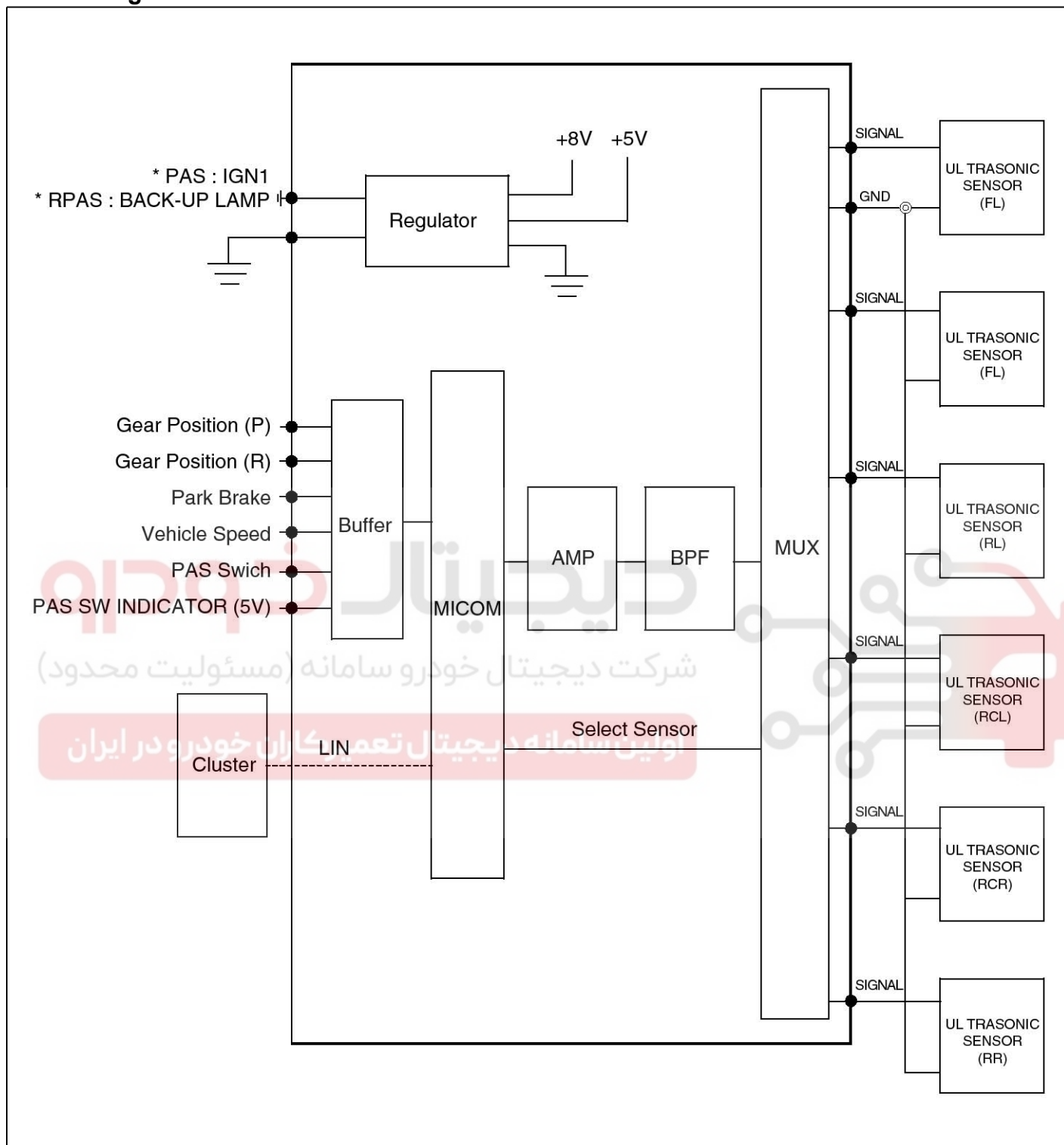


SVGBE0362L

# Front / Rear Parking Assist System

# BE-531

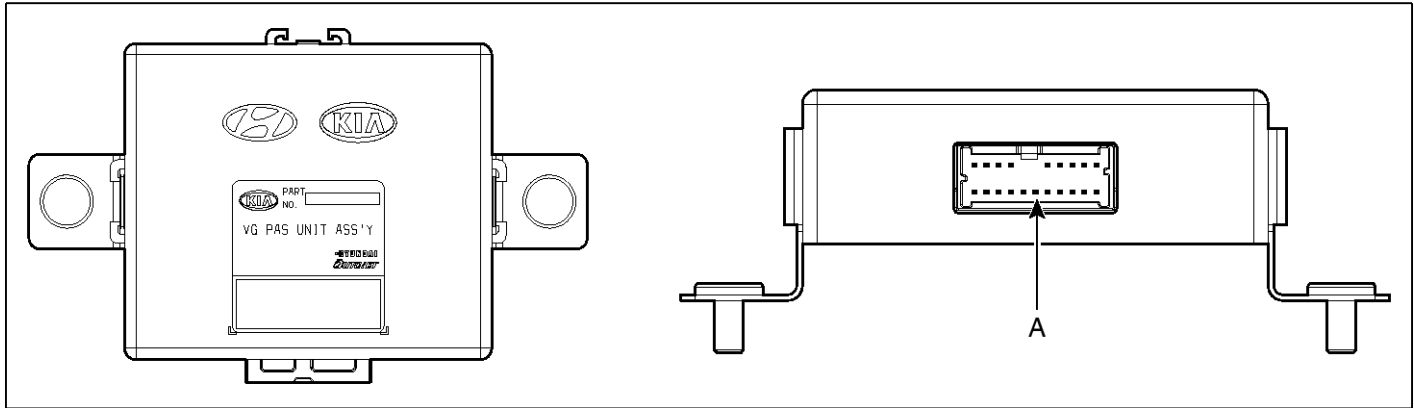
## Circuit Diagram



SVGBE0363L

**BE-532**

**Body Electrical System**



SVGBE0379L

| 16 pin connector (A) |                          |                          |
|----------------------|--------------------------|--------------------------|
| Pin                  | PAS (Front/Rear)         | RPAS (Rear)              |
|                      | Description              | Description              |
| 1                    | LIN                      | -                        |
| 2                    | -                        | -                        |
| 3                    | Front left signal        | LIN                      |
| 4                    | Front signal             | LIN                      |
| 5                    | -                        | -                        |
| 6                    | Rear left signal         | Rear left signal         |
| 7                    | Rear right signal        | Rear right signal        |
| 8                    | Rear center left signal  | Rear center left signal  |
| 9                    | Rear center right signal | Rear center right signal |
| 10                   | IGN1                     | Back up lamp             |
| 11                   | -                        | -                        |
| 12                   | Main GND                 | -                        |
| 13                   | -                        | -                        |
| 14                   | Vehicle speed            | Main GND                 |
| 15                   | Gear R                   | -                        |
| 16                   | Gear P                   | -                        |
| 17                   | Parking brake            | -                        |
| 18                   | PAS OFF switch           | -                        |
| 19                   | PAS indicator            | -                        |
| 20                   | Sensor GND               | Sensor GND               |

# Front / Rear Parking Assist System

## BE-533

### Description

When reversing, the driver is not easy to find objects in the blind spots and to determine the distance from the object. In order to provide the driver safety and convenience, back warning system will operate upon shifting to "R" Ultrasonic sensor will emit ultrasonic wave rearward and detect the reflected wave. Control unit will calculate distance to the object using the sensor signal input and output buzzer alarm in three steps (first, second and third alarm).

### Functional Specification

1. RPAS(Rear Parking Assist System) functional specification.
  1. Use Back-up Lamp power. (On'R' gear power supplied)
  2. In the state of IGN ON, when gear is shifted to 'R' ECU checks whether sensors have fault or not and find no defect, it rings the initial starting sound 0.5 sec after power supplied. But, In case it finds any defects among sensors, it rings the alarm sound of the fault sensor.
  3. Alarms of obstacle consists of 3 level 1,2,3 step and 1,2 alarm sounds intermittently and 3 alarm sounds continuously.
  4. Cluster controls lighting the INDICATOR that is in it by the alarm levels.
  5. Effective RPAS vehicle speed is under 10Km/h.
2. PAS(Parking Assist System) functional specification.
  1. Use the IGN1 Power. (IGN1 ON action)
  2. PAS SYSTEM is enabled when Moving forward is under the condition of PAS switch On and vehicle speed is under 10 KPH and backward is under 15KPH.
  3. Front System is enabled when Gear is putting somewhere except for 'P' range position or Parking Brake is released.
  4. Gear shifted to 'R', Rear PAS System will start.
    - Front System makes Front 2 sensor (FL,FR) enabled.
    - Rear System makes the Front 2 sensors (FL,FR) and Rear 4 sensors (RR,RCL,RCR,RR) enabled.

### 3. System function flow.

1. Above 1), 2), 3) or 1), 2), 4) conditions, the system will start.
2. Front System has no initial starting sound when it starts and does an alarm system when it detects the obstacle according to distance.
3. When Rear System is in operation, initial starting sound is ringing 0.5 second just after R gear is shifted and conducts the alarm system by the distance.
4. Some of sensors have faults, Front system or Rear system sends a fault alarm sound and displays the sensors on the cluster.
5. Alarms of obstacle consists of 3 level 1,2,3 step and 1,2 alarm sounds intermittently and 3 alarm sounds continuously But Front System does not have 1 step alarm, and in 2 step alarm it just turns on the INDICATOR in the cluster.
6. According to alarm level. Cluster controls turning the INDICATOR on that is in it.
7. PAS System is in operation under the condition of PAS switch ON, and PAS switch will keep its last status when IGN is OFF even.
8. PAS switch OFF will be released when the Gear is shifted to 'R' automatically. PAS switch is recover to OFF condition If PAS OFF released when applying 'R'Gear.
  - IN PAS switch ON, INDICATOR that is in PAS switch turns on and PAS ECU controls the INDICATOR light.
  - PAS switch Factory initial condition is ON.

# BE-534

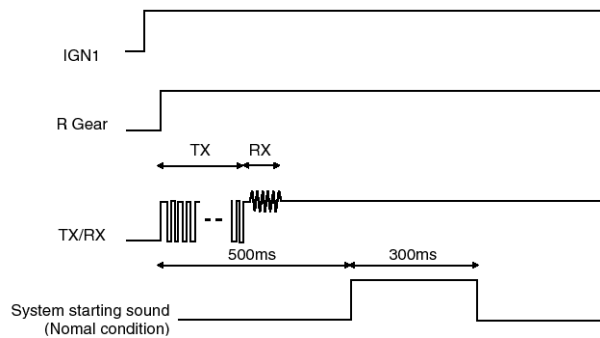
# Body Electrical System

## PAS alarm method

Obstacle are detected by PAS, It alarms driver through the hearing and visual device. But, PAS ECU transmits alarm data to CLUSTER by LIN communication and cluster starts to show visual alarm through alarm data.

### 1. PAS alarm sound specification.

In the state of IGN ON, and PAS or RPAS turn active, System will do work as below.



SVGBE0378L

If Front system and Rear system has common operational condition (3.1 reference), MICOM checks every sensor and if it finds no fault, after 500ms sends the initial starting Sound for 300ms (But, initial starting sound works not PPS but only under the RPAS system. But, if it finds any defect, it sends fault sound and show fault sensor through INDICATOR.

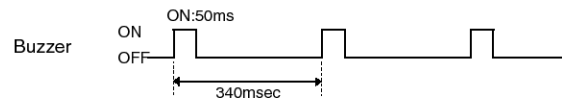
※ In Front system, initial starting sound doesn't work but in case PAS sensors have any fault sends fault sound and shows through INDICATOR under the PAS ON condition.

※ Acceptable wave error range  $\pm 10\%$

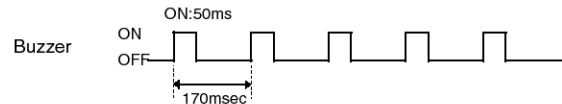
### 2. Alarm sound output spec by the distance

#### ※ Rear buzzer alarm sound

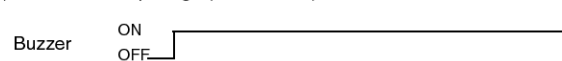
##### 1) First alarm step range (61cm~100cm)



##### 2) Second alarm step range (41cm~60cm)



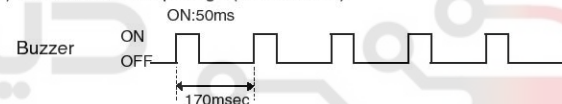
##### 3) Third alarm step range (under 40cm)



SVGBE0381L

#### ※ Front buzzer alarm sound

##### 1) Second alarm step range (41cm~60cm)



##### 2) Third alarm step range (under 40cm)



SVGBE0382L

### NOTICE

1. Acceptable wave error range:  $\pm 10\%$
2. Under 30cm area, alarm sound could not work.
3. By the Vehicle moving and target shape, distance alarms could not be in order.
4. Alarm sound comes from CLUSTER and period and alarm lasting time of alarm could be changed.

# Front / Rear Parking Assist System

# BE-535

3. INDICATOR display method.

When the System starts, CLUSTER controls INDICATOR according to alarm data like below. If it finds any obstacle, lights immediately, and doesn't find anything, Front System do nothing but Rear System lights INDICATOR as a nothing alarm for 2 seconds after 'R' gear and turns off (If it senses obstacle and then has no obstacle, it lights INDICATOR as a nothing alarm and turns off)

### ※ PAS(Front, Rear alarm System) INDICATOR Display

| Alarm Step        | Nothing alarm | 1 alarm (lighting)<br>(81Cm ~ 120Cm) | 2 alarm (lighting)<br>(41Cm ~ 80Cm) | 3 alarm (lighting)<br>(under 40Cm) |
|-------------------|---------------|--------------------------------------|-------------------------------------|------------------------------------|
| INDICATOR display |               |                                      |                                     |                                    |

SVGBE0383L

### ※ RPAS(Rear Parking Alarm System) INDICATOR Display

| Alarm Step        | Nothing alarm | 1 alarm (lighting)<br>(81Cm ~ 120Cm) | 2 alarm (lighting)<br>(41Cm ~ 80Cm) | 3 alarm (lighting)<br>(under 40Cm) |
|-------------------|---------------|--------------------------------------|-------------------------------------|------------------------------------|
| INDICATOR display |               |                                      |                                     |                                    |

SVGBE0384L

### NOTICE

It displays the position of detected obstacle. Front sensor has no 1 step alarm display (sensing area under 60Cm). Front system has no alarm sound but only display in 2 step alarm. 3 step alarm turns on/off 1 sec cycle (0.5sec ON, 0.5sec OFF). If Front system and Rear system release the operational condition, cluster stops the INDICATOR display and alarm sound immediately. (within 230ms)



## BE-536

## Body Electrical System

## ※ INDICATOR light control

|                                     | Front PAS SYSTEM                              | Rear Front PAS SYSTEM                         |
|-------------------------------------|-----------------------------------------------|-----------------------------------------------|
| <b>System starting(no obstacle)</b> | NO INDICATOR                                  | Display nothing alarm for 2 seconds           |
| <b>System starting (obstacle)</b>   | Turn INDICATOR on immediately by the distance | Turn INDICATOR on immediately by the distance |
| <b>Alarm released</b>               | Display nothing alarm for 2 seconds           | Display nothing alarm for 2 seconds           |
| <b>System operational released</b>  | Released immediately                          | Released immediately                          |

※ When alarm is working on and released, or nothing alarm, if system operational condition released, display and alarm sound stop immediately.

※ In releasing alarm condition, INDICATOR lights turns off within 230ms.

## 4. PAS ECU and CLUSTER alarm data process.

Cluster response the alarm data from PAS ECU and lights INDICATOR. If it needs alarm delay or INDICATOR light delay, it controls the alarm data as below.

| Alarm data status                                              | Data control | remark                                                                                                                        |
|----------------------------------------------------------------|--------------|-------------------------------------------------------------------------------------------------------------------------------|
| 1,2,3 level alarm data send                                    | PAS ECU      | Cluster response 1,2,3 level alarm data immediately from PAS ECU                                                              |
| After 'R'Gear, no alarm and after 1,2,3 level alarm , no alarm | CLUSTER      | Cluster display nothing alarm for 2 seconds after sending 1,2,3 level alarm sound, if cluster get no alarm data from PAS ECU. |
| In obstacle gets far, alarm data delay                         | PAS ECU      | PAS ECU has 1sec alarm delay when the obstacle gets far or alarm is released after entering the alarm process.                |

※ But recognize R Gear starting point from the initial sound data that comes from PAS ECU.



# Front / Rear Parking Assist System

## BE-537

### 5. Self diagnosis and fault alarm specification.

System starts to fault alarm when it finds PAS sensor fault.

PAS Sensor fault type is as below.

- Sensors fault.
- Sensor signal line OPEN or SHORT to GROUND Error diagnosis is performed by the error time and error type.

Error diagnosis is performed by the error time and error type.

#### 1) Fault diagnosis by the fault time.

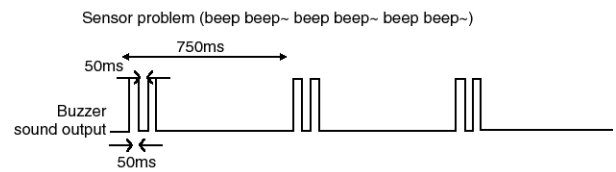
1. On System starting → Display the INDICATOR after inform the fault sensor through the alarm sound(sensor circuit open or GROUND SHORT).
2. On the normal operation, fault occurs (including the fault releasing and normal operation) → No fault alarm, just INDICATOR show the fault sensor.

#### 2) Fault diagnosis by Fault type.

1. Sensor fault (sensor circuit fault or sensor cell breakdown)→ INDICATOR displays that fault.
2. Sensor WIRE fault (OPEN or GROUND SHORT)→ INDICATOR displays that fault.
3. Sensor drive device of ECU fault→ INDICATOR display as if the sensor has a fault.

### 6. Sensor fault alarm sound output specification.

In system initial starting, if it has fault sensor, it sounds as below.



SVGBE0385L

※ Acceptable wave error range:  $\pm 10\%$

※ After sensor fault alarm sound are sent, the other sensors work normally.

※ There is no fault alarm when the fault occurs during working normally.

※ Alarm sound comes from CLUSTER and period and alarm lasting time of alarm could be changed (If it has any changes, cluster firm must notify Body Control Design team and Chassis Safety control team and MOBIS of changes)

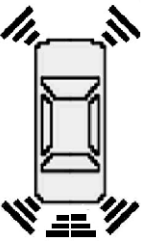
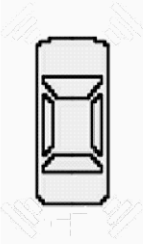


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## BE-538

## Body Electrical System

## 7. Sensor fault display method.

| Alarm level       | 0.5sec lighting                                                                   | 0.5sec off                                                                          |
|-------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| INDICATOR display |  |  |

SVGBE0386L

Indicator lights only Fault sensor and when the sensor fault is released, faulty display will be disappeared. But, it is supposed to display the fault when it occurs on the work. When the RCL, RCR have fault at the same time, INDICATOR displays the fault in each section. In case either RCL or RCR has problem, INDICATOR distinguish the fault sensor and display the fault sensor. But, when the system works with one sensor, display through the INDICATOR doesn't work.

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

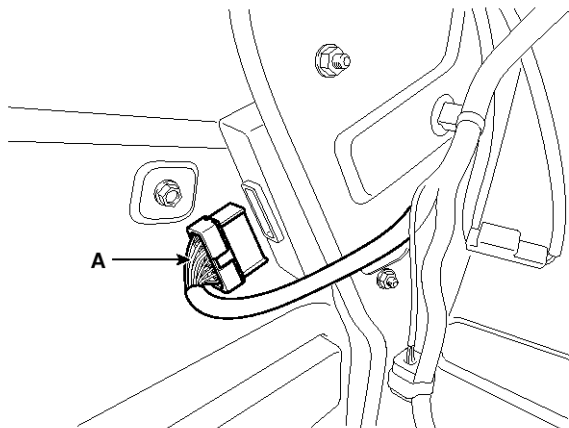


# Front / Rear Parking Assist System

## BE-539

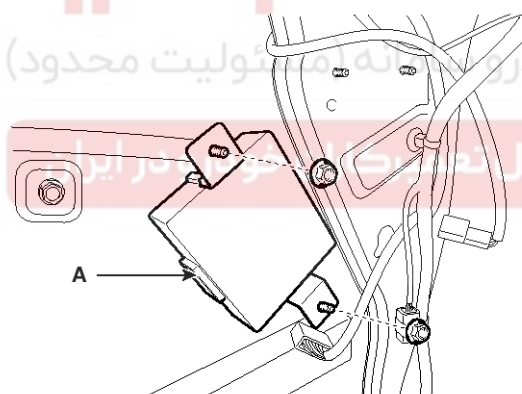
### Removal

1. Remove the rear left luggage side trim of the trunk (Refer to the Body group - "Interior trim")
2. Disconnect the front/rear parking assist system control unit connector (A).



SVGBE0170D

3. Loosen the mounting nuts and remove the front/rear parking assist system control unit (A) from the quarter panel.



SVGBE0171D

### Installation

1. Install the rear parking assist system control module.
2. Install the rear left luggage side trim of trunk.

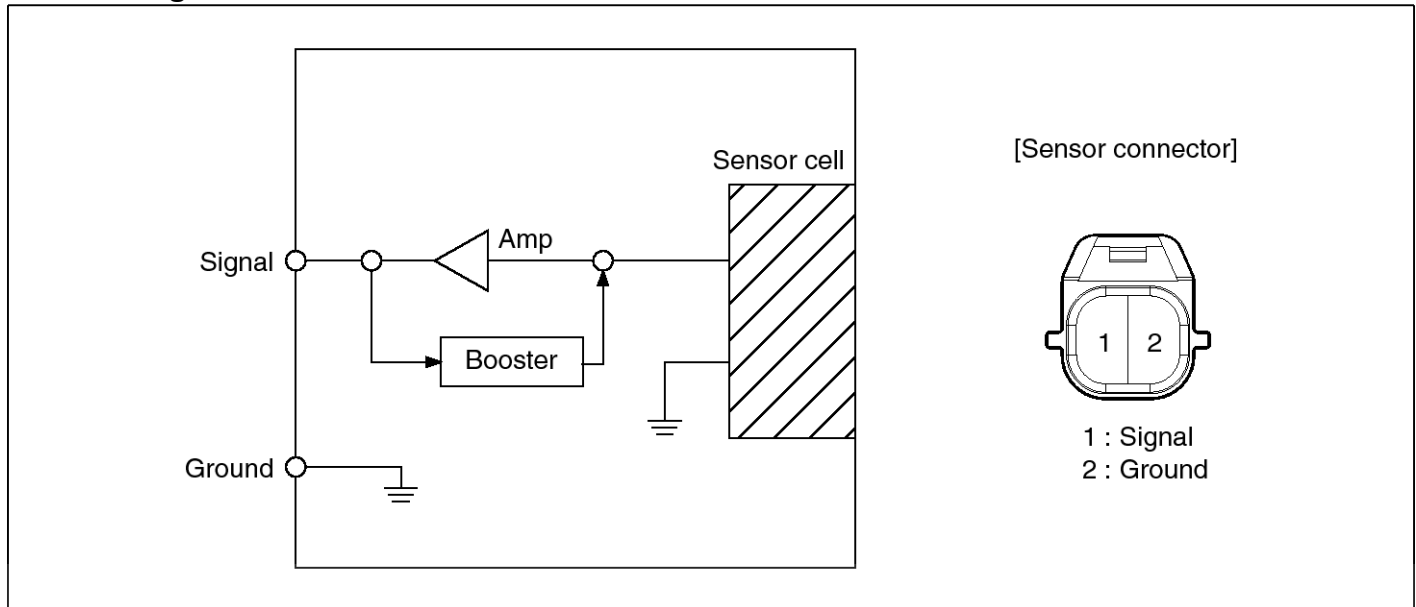


# BE-540

# Body Electrical System

## Parking Assist Sensor

### Circuit Diagram



SVGBE0364L

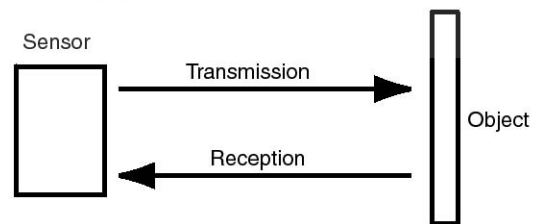
### Operation

The sensor emits ultrasonic wave to the objects, and it measures the time until reflected wave returns, and calculates the distance to the object.

### Distance Detection Type

Direct detection type and indirect detection type are used together for improving effectiveness of the detection.

1. Direct detection type: One sensor transmits and receives signals to measure the distance.

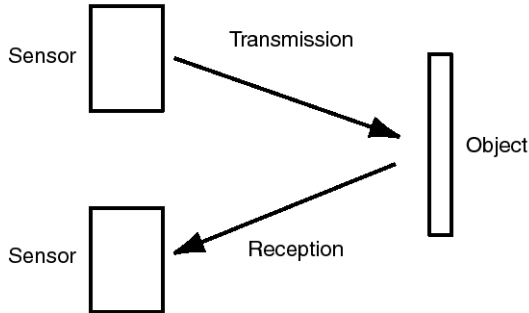


ETRF762A

# Front / Rear Parking Assist System

# BE-541

2. Indirect detection type: One sensor transmits signals and the other sensor receives the signals to measure the distance.



ETRF762B

## Measurement Principle

Back warning system (BWS) is a complementary device for reversing. BWS detects objects behind vehicle and provides the driver with buzzer alarm finding objects in a certain area, using ultrasonic wave propagation speed and time.

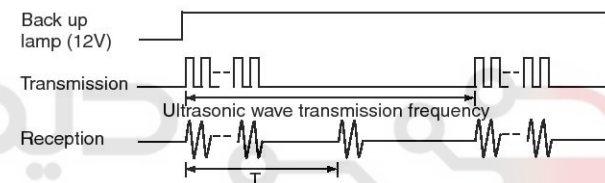
The propagation speed formula of ultrasonic wave in air is following :

$$v = 331.5 + 0.6t \text{ (m/s)}$$

v = ultrasonic wave propagation speed

t = ambient temperature

The basic principle of distance measurement using ultrasonic wave is :



$$D = (T \times V) / 2 [m]$$

D = Distance to object      V = Ultrasonic wave speed [340m/s]  
 T = Ultrasonic wave propagation time

ETRF762C

خودرو دیجیتال (مسئولیت محدود)

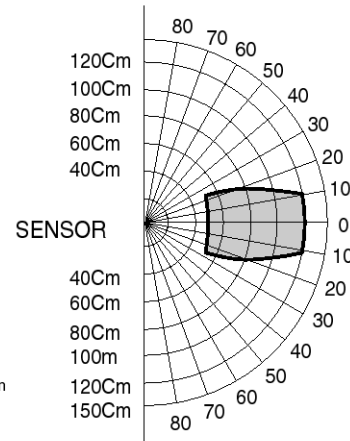
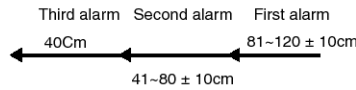
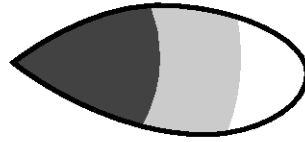
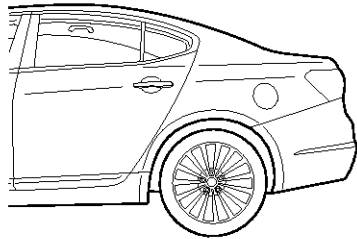
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

# BE-542

# Body Electrical System

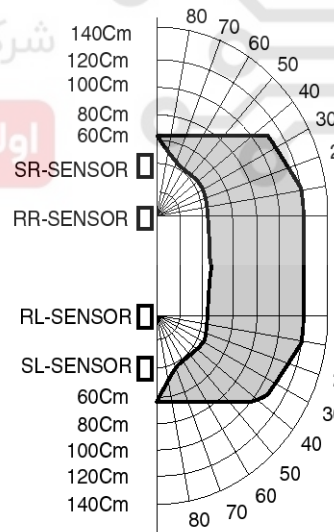
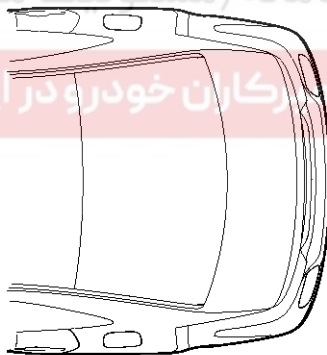
## Sensor Detection Range

[Vertical range]



- Distance tolerance(Measured at the front of sensor)
  - 81~120cm (31.4 ~ 47.2 in) : ±10cm (±3.9 in)
  - 41~80cm (15.7 ~ 31.4 in) : ±10cm (±3.9 in)
  - 40cm (15.7 in) : ±10cm (±3.9 in)
- Detection tolerance
  - At 40cm (15.7 in) : 45° ± 15°
  - At 80cm (31.4 in) : 30° ± 15°
  - At 120cm (47.2 in) : 20° ± 15°
- At nearer distance than 40cm detection may occur.
- Measurement condition : Room temperature (20°C/68°F), 90mm(3.5 in) diameter, 3m(9.8 ft) length rod.

[Horizontal range]



- Distance tolerance(Measured at the front of sensor)
  - 81~120cm (31.4 ~ 47.2 in) : ±10cm (±3.9 in)
  - 41~80cm (15.7~ 31.4 in) : ±10cm (±3.9 in)
  - 40cm (15.7 in) : ±10cm (±3.9 in)
- Detection tolerance
  - At 80cm (31.4 in) : 30° ± 15°
  - At 120cm (47.2 in) : 20° ± 15°
- At nearer distance than 40Cm(15.7 in) detection may occur.
- Measurement condition : Room temperature (20°C/68°F), 75mm(2.95 in) diameter, 1m(3.2 ft) length rod.

SVGBE0365L

# Front / Rear Parking Assist System

## BE-543

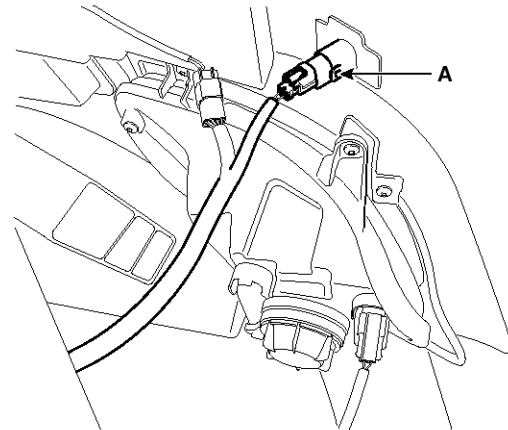
### NOTICE

1. 75mm(2.95 in) (Diameter) plastic rod is used for the test target.
2. The test result may differ by a different target object.
3. Detection range may be reduced by dirt accumulated on sensor, and extremely hot or cold weather.
4. The following object may not be detected.
  - Sharp object or thin object like rope.
  - Cotton, sponge, snow or other materials absorbing sonic wave.
  - Smaller objects than 75mm(2.95 in) (Diameter), 1m(3.2 ft) length.

### Removal

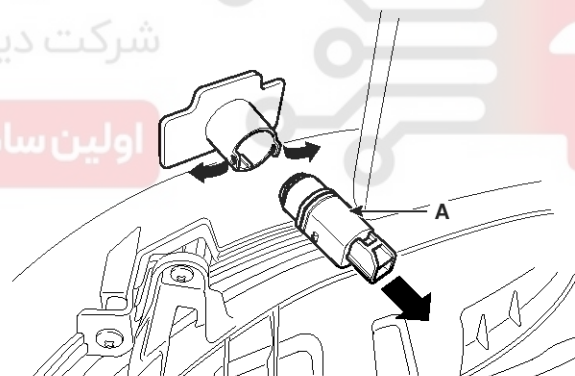
#### [Front Bumper]

1. Remove the front bumper. (Refer to the Body group - "Front Bumper")
2. Disconnect the sensor connector (A) on the inside of the front bumper.



SVGBE0174D

3. Pull out the front sensor (A) from the sensor holder by opening the sensor holder out.



SVGBE0175D

دیجیتال خودرو  
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

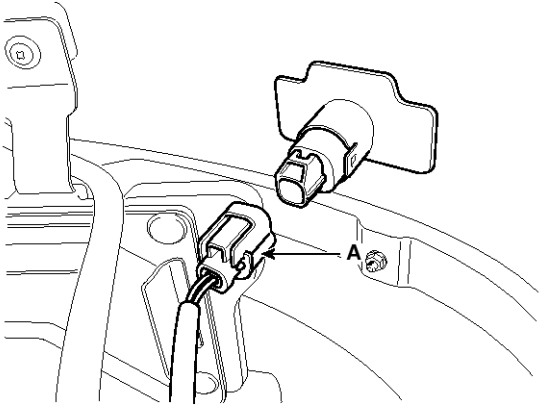


## BE-544

## Body Electrical System

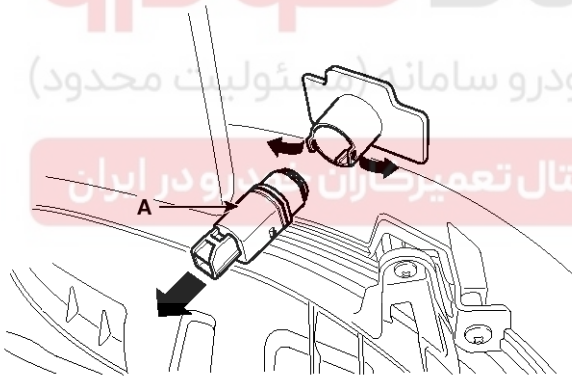
### [Rear Bumper]

1. Remove the rear bumper. (Refer to the Body group - "Rear Bumper")
2. Disconnect the sensor connector (A) on the inside of the rear bumper.



SVGBE0176D

3. Pull out the front sensor (A) from the sensor holder by opening the sensor holder out.



SVGBE0177D

### ⚠ CAUTION

Be careful not to damage the sensor holder housing.

### Installation

#### [Front Bumper]

1. Connect the connector, and then install the sensor.
2. Install the front bumper.

#### [Rear Bumper]

1. Connect the connector, and then install the sensor.
2. Install the rear bumper.



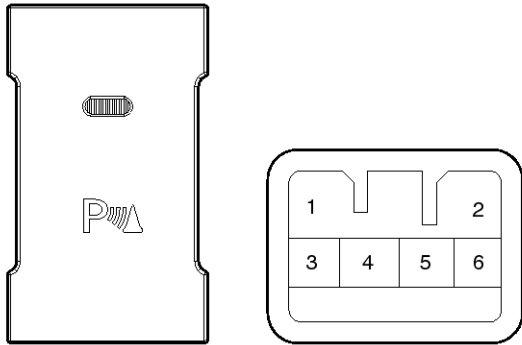
# Front / Rear Parking Assist System

# BE-545

## Front Rear Parking Assist System Switch

### Inspection

1. Check for continuity between the terminals. If continuity is not specified, replace the switch (A).



SVGBE0125D

| Position / Terminal | ON(Push) | OFF(Free) | Remarks          |
|---------------------|----------|-----------|------------------|
| 3                   |          |           | GND              |
| 6                   |          |           | Unit             |
| 4                   |          |           | Indicator (-)    |
| 1                   |          |           | Indicator (+)    |
| 5                   |          |           | Illumination (-) |
| 2                   |          |           | Illumination (+) |

SVGBE0366L

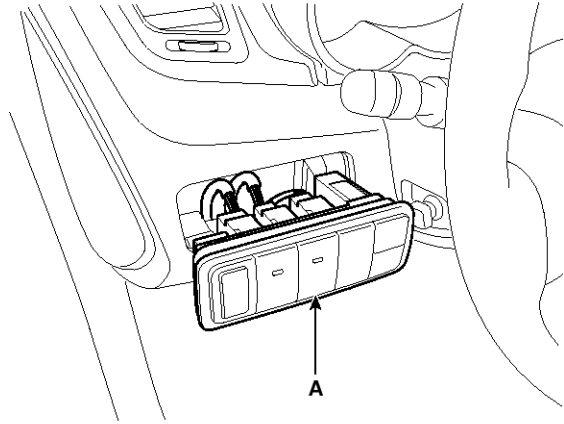
### Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the passenger compartment junction box cover.

3. Remove the crash pad side switch assembly (A) by pushing it through junction box cover hole.

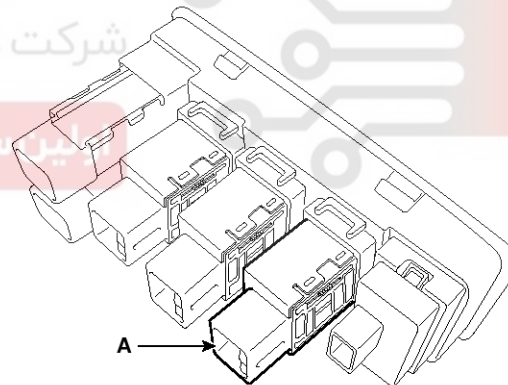
### NOTICE

Put on gloves to protect your hands.



SVGBE0178D

4. Remove the parking assist switch (A) after disconnecting the connectors.



SVGBE0179D

### NOTICE

Take care not to damage the hook when removing the rheostat switch.

### Installation

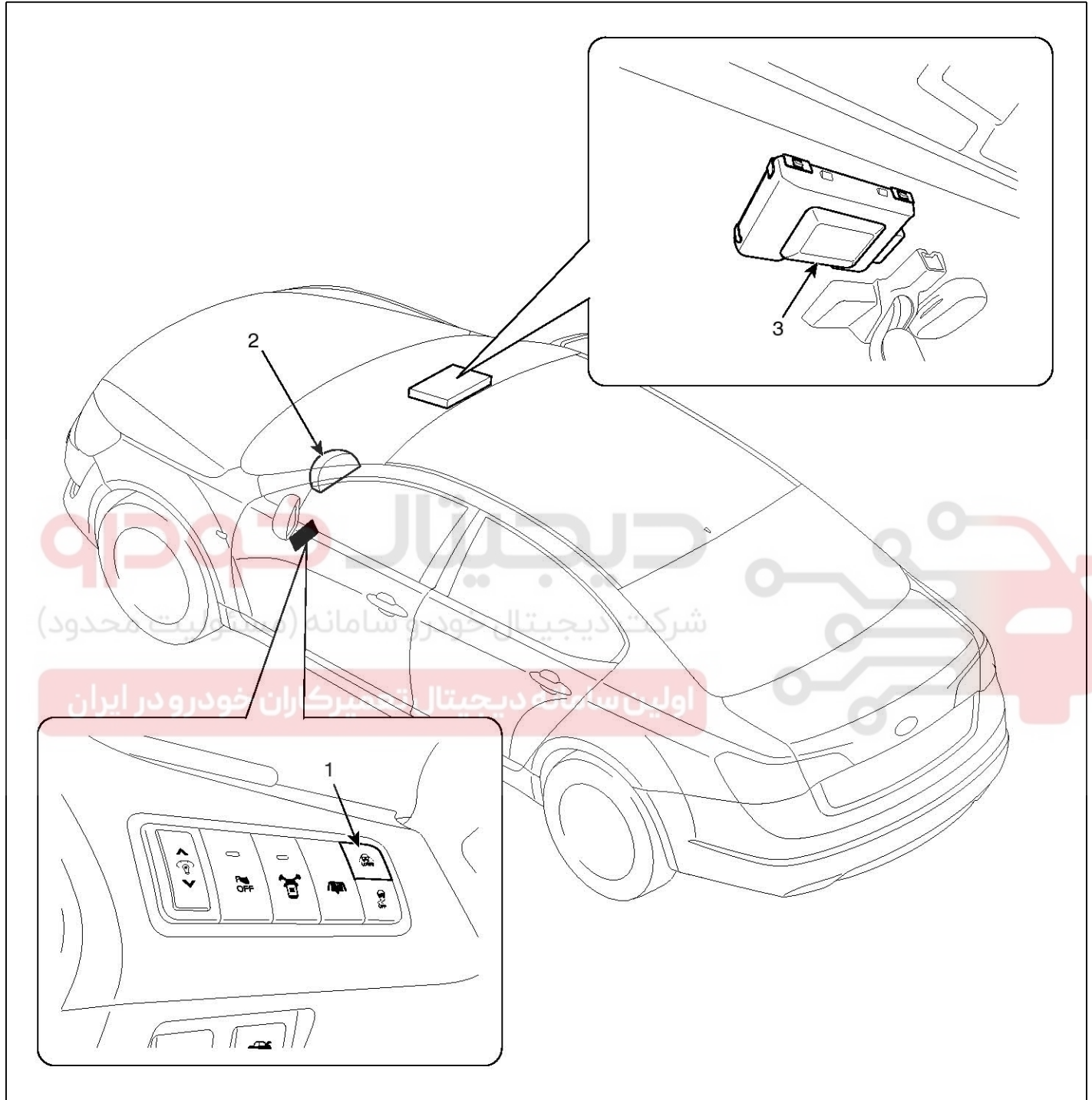
1. Install the switch assembly connector.
2. Install the switch assembly.
3. Connect the negative (-) battery terminal.

# BE-546

# Body Electrical System

## Lane Departure Warning System (LDWS)

### Components



SVGBE0146D

- 1. LDWS ON/OFF Switch
- 2. Instrument Cluster

- 3. LDWS Unit & Camera Module

# Lane Departure Warning System (LDWS)

## BE-547

### Description

#### System Operation

Typically, lane departure warning is activated at a speed over 60 km, but suppressed in case of unintentional lane departure when driver do not operate turn signal.

#### System Operation Conditions

1. User Conditions
  - 1) When unintended lane departure is occurred, warnings are generated.
  - 2) When driver operates a turn signal for lane departure, no warnings are generated.
  - 3) When driver operates wiper, no warnings are generated according to operating conditions (Wiper High)
2. Vehicle Conditions
  - 1) When the accelerated velocity of vehicle exceeds certain speed, LDW system is activated.
  - 2) When a turn signal is not used. LDW system activates.
  - 3) LDWS system is not activated when wipe motor speed is more than 45 RPM, even if the vehicle is equipped with rain sensor.
3. Lane Conditions
  - 1) lanes are visible and recognizable , LDWS can be on normal operation mode.
  - 2) Operate on all roads, including highways, country roads and urban freeways at a speed of 60 km/h and from 2.7 to 5.0 meters of lane width.
  - 3) Lane material: asphalt roads, concrete roads
  - 4) Lane color: White, Yellow, Blue,
  - 5) Temporary lane marker for repairing road
  - 6) lanes are visible and recognizable, LDWS can be on normal operation mode independent of season or time,
  - 7) Operate under partially visible lane markers such as and regardless of inclement weather, including rain and wet roads, and time limit
  - 8) Be performed in a curve of radius 250 meters

### Lane Departure Warning

This lane Departure Warning Algorithm is for HKMC whole vehicle that will apply to LDWS

1. Lane departure warning start speed: 60KPH

- 1) Warning Start Speed: 60KPH
- 2) Warning Stop Speed: 55KPH

To prevent repetition of system warning on and off according to vehicle speed variation, This specification establish warning stop speed as 55 KPH for hysteresis characteristic.

2. Lane Recognition Standard Speed : 40KPH

- 1) Lane recognition start speed : 40KPH

Lane recognition is started at 40KPH less than warning start speed to minimize recognition time after vehicle is driven into lane.

- 2) Lane recognition stop speed: 35KPH

Lane recognition stop speed is setted 35KPH with hysteresis to avoid repetition of lane recognition on and off.




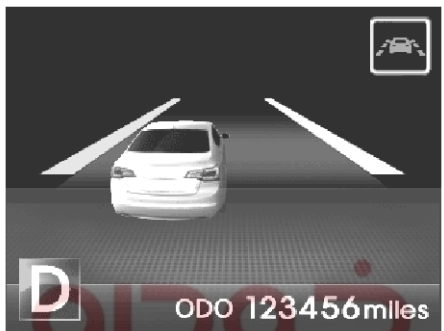


- 3) Cluster can not display lane recognition even if lane detected, cluster display lane recognition when operation speed is more than 60KPH.

3. Warning Method

- 1) Warning Device  
Cluster, Buzzer
- 2) Cluster Display Symbols

BE-548

Body Electrical System

|                                                                                                     |                                                                                                      |                                                                                                        |
|-----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
|  <p>SVGBE0367L</p>  |  <p>SVGBE0368L</p>  |  <p>SVGBE0369L</p>  |
| <p>Lane not detected</p>                                                                            | <p>Lane detected and warning system engaged</p>                                                      | <p>Right side deviation</p>                                                                            |
|  <p>SVGBE0370L</p> |  <p>SVGBE0371L</p> |  <p>SVGBE0372L</p> |
| <p>Left side deviation</p>                                                                          | <p>Wiper motor speed is more than 45 R-PM</p>                                                        | <p>System malfunction</p>                                                                              |

※ Display symbol and period vary according to vehicle's LCD and alarm.  
(It is possible to adjust blinking period.)

**Lane Type**

LDW System can recognize a full lane, a dotted lane, Bott's Dot and yellow Retroreflective on a road.

In case of double lane, LDW System can recognize the lane on the inside. This is a standard about a dotted lane.

**Recognition of double lane**

In case of double lane, LDW System can recognize the lane on the inside.



# Lane Departure Warning System (LDWS)

## BE-549

### Determination of Lane Departure

Lane Departure is determined according to vehicle speed, lane width and color.

LDW System set lane recognition error limits under 8cm.

#### 1. Lane width (L)

If Lane width is 2.7 ~ 5.2m(Including North America standard) then departure warning is activated. Also Lane width is less than 2.8m then departure warning is deactivated.

#### 2. Line painted width (p)

Line painted width is referred to 16cm (the minimum 10cm, the maximum 55cm). LDWS can distinguish left,right lane color. If it is technically possible, LDWS can distinguish kind of lane such as solid and dot.

#### 3. Vehicle Width (W)

Vehicle width is defined by kind of vehicle. Vehicle width is stored in internal memory and can be written by In-line tool using WriteDataByLocalIdentifier command or vehicle project code

#### 4. Lane Departure Warning Standard of Left Yellow Lane (Central Lane)

- condition 1 : Gap between yellow lane and a median strip is 25cm.

→ In case of road limit speed less than 80KPH, The distance between central lane and lane designs 25cm

- condition 2 : Yellow line width is 16cm as same line painted width.

##### A. Central lane Departure Warning

Central lane departure warning is activated when Vehicle's tire reaches to lane.

##### B. Cancellation of Central lane Departure Warning

When the vehicle departs the lane toward opposite lane more than 40% of the lane width, the warnings are deactivated.

#### 5. Left,Right normal Lane (Blue, White, Right Yellow)

Condition : Lane width standard is a 16cm.

##### a. 1st Lane Departure Warning

The departure alarm of the general lane when the wheel of the vehicle reaches to the lane, does in standard.

##### b. Cancellation of lane departure warning

When the vehicle departs the lane toward opposite lane more than 40% of the lane width, the warnings are stopped.

#### 6. The case of recognizing one of two lines (lane)

The case of recognizing one of two lane, system provide departure warning using one line.

### Lane departure warning deactivation

#### 1. Turn signal is activated

##### a. Depart from lane after turn signal is activate

If vehicle departs from lane after turn signal is activated, the departure warning of turn signal direction is not activated. If vehicle departs from opposite line of turn signal direction, Departure warning is activated. Warning alarm is not activated while turn signal is activated. If turn signal is deactivated during lane departure after turn signal activates, system can issue warning after 2sec when it can recognize lane.

If turn signal is deactivated after lane departure during turn signal activated, Warning signal can be generated after 2 second.

##### b. Turn signal is activated after lane departure

Alarm is immediately deactivated when driver operates turn signal during lane departure.

Alarm can be activated again after 2 second when turn signal is deactivated.

#### 2. When Wiper operation signal is given, the condition of deactivation

When driver operate wiper switch, LDWS do not excute lane departure warning.

Wiper motor speed is high : If wiper motor speed is more than 45 RPM, lane departure warning does not be activated.

## BE-550

## Body Electrical System

### 3. Tracking on a curve under 250m radius

When measured curve radius which is derived from lane recognition and Yaw Rate is under 250m,

LDWS do not warn lane departure. LDWS can recognize if a road curvature condition is under 250m

( $R \geq 250m$ )

### 4. Lane is unrecognizable

#### a. During the warning, lane becomes unrecognizable

- In lane departure alarm, the case where one lane becomes unrecognizable: Alarm is activated using previously measured lane width, a hue and a curvataure.
- In lane departure alarm, the case where both lanes become unrecognizable: Lane departure Warning is immediately stopped and LDWS signal that lanes are unrecognizable to warn its condition to driver.

#### b. A line is unrecognizable

During vehicle is tracking the lane, if a line is not recognizable, LDWS can excute lane dwparture warning using previous lane width which is measured from previous image processing. LDWS normally refer the color of lines to previous recognition result, but if there are any changes of system operation and power on/off, when system can not determine the color of the lane, system can excute lane departure warning algorithm refer lane color to white. When system line unrecognizd state is maintained, System status is changed to line unrecognizd state.

#### c. Both lanes are unrecognizable

LDWS signal the status of unrecognizable lane. If there are none of additional indicator, system do not indicate recognition status.

### ⚠ CAUTION

LDWS is capable of recognizing continuing lines as lanes and has limited lane recognition capabilities when it comes to sharp-bending roads.

In addition, the system may not function properly under the following circumstances:

- No or faded lane markings (failed lane detection).
- Low visibility due to foul weather conditions.
- Low light or sudden change in exterior light conditions.
- Sharp bends of the road (curvature radius of less than 250m).
- Sidewalks and other dividing structures along the edge of the lane.
- Dirty windshield (low camera visibility).





# Lane Departure Warning System (LDWS)

## BE-551

### Camera Calibration

#### 1. Necessity

Once installed to the vehicle, LDWS needs to be calibrated to achieve accurate lane marking recognition.

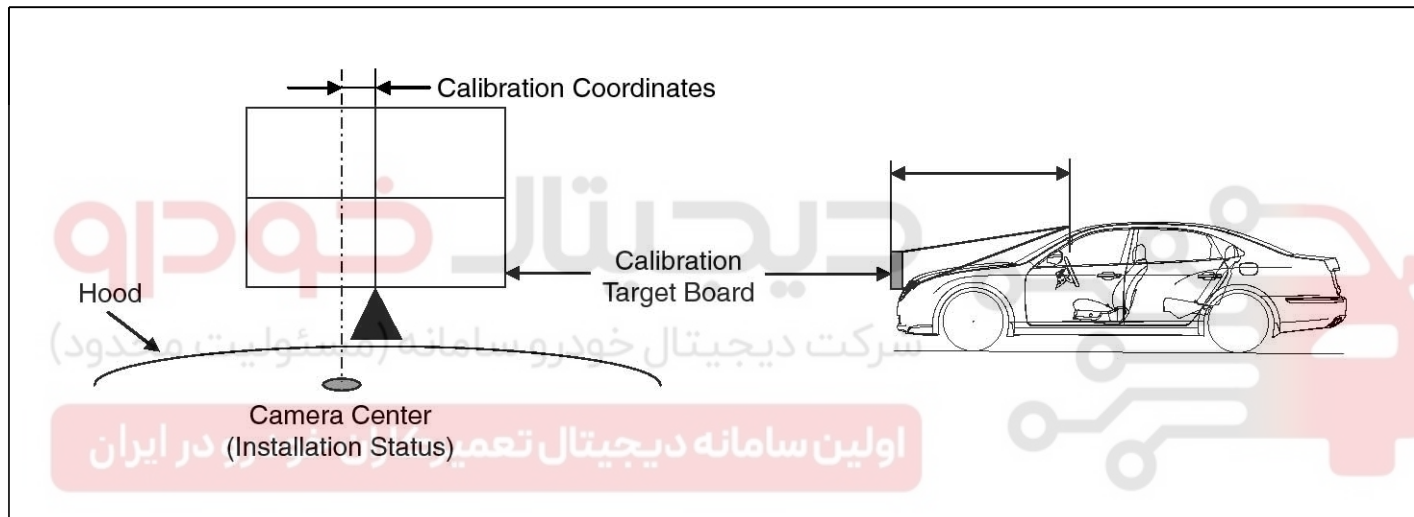
Specifically, the system needs to be calibrated to correct any difference between the ideal road coordinates and the actual road coordinates.

- When replacing the lane departure warning system unit.
- When repairing the roof panel of chassis by vehicle crash.
- When repairing the LDWS unit mounting bracket
- The system need to be calibrated to corect any vehicle crash.

#### 2. Schedule

Calibrate after LDWS replacement and as necessary.

- **Condition** : There should be an error between ideal road coordinates and actual road coordinates after installing the LDWS unit.
- **Object** : Calibrate an error in LDWS unit to improve coordinates accuracy.
- **Procedure** : Operate the calibration procedure using the GDS and calibration target jig.
- **Environment** : Vehicle on an even surface and align the center of target jig to down the degree of scattering.
- **Calibration process** : Refer to bellow "Calibration procedures"



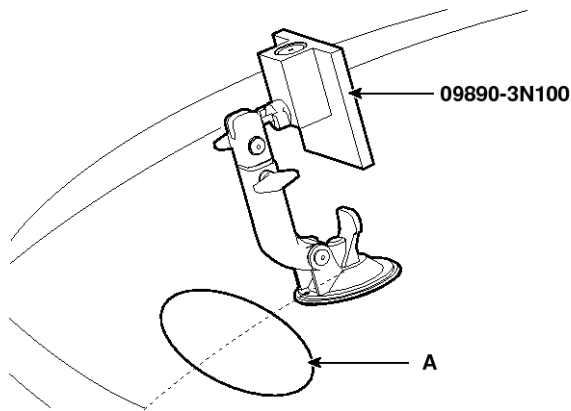
SVGBE0373L

# BE-552

# Body Electrical System

## Calibration Procedures

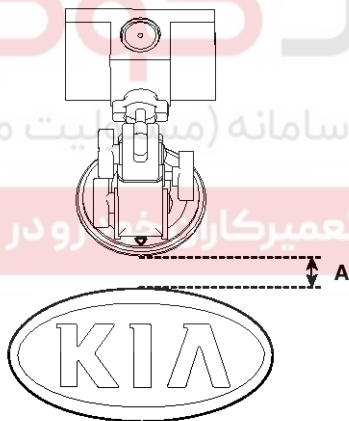
1. Install the calibration target jig (09890-3N100) on the hood.



SVGBE0374D

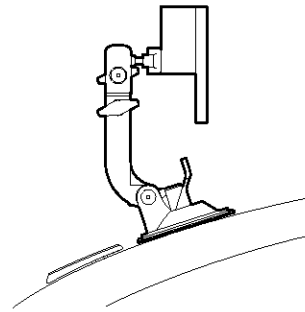
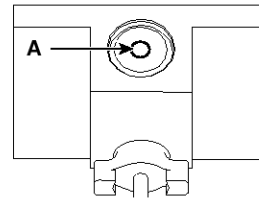
2. Align the center of target jig with the end of emblem as shown in the picture.

**Tolerance :**  $0.78 \pm 0.19$  in ( $20 \pm 5$ mm)



SVGBE0374L

3. Adjust the top of target jig to center a drop of air (A) in circle by bending the target board.  
(To adjust the target vertically)



SVGBE0376D

4. Connect GDS to the vehicle to calibrate LDWS unit.
5. Select model and LDWS system.
6. Select calibration.
7. Operate calibration automatically.
8. Select "LDWS Reference Point Calibration" and complete calibration procedures.

### Coordinates allowance ranges

X : 180 ~ 205  
Y : 140 ~ 165

# Lane Departure Warning System (LDWS)

BE-553

ECU Information

→ System Information

ID Register

→ LDWS Reference Point Calibration

SVIBE9267L

LDWS Reference Point Calibration



[ LDWS Reference Point Calibration ]

LDWS Reference Point Calibration

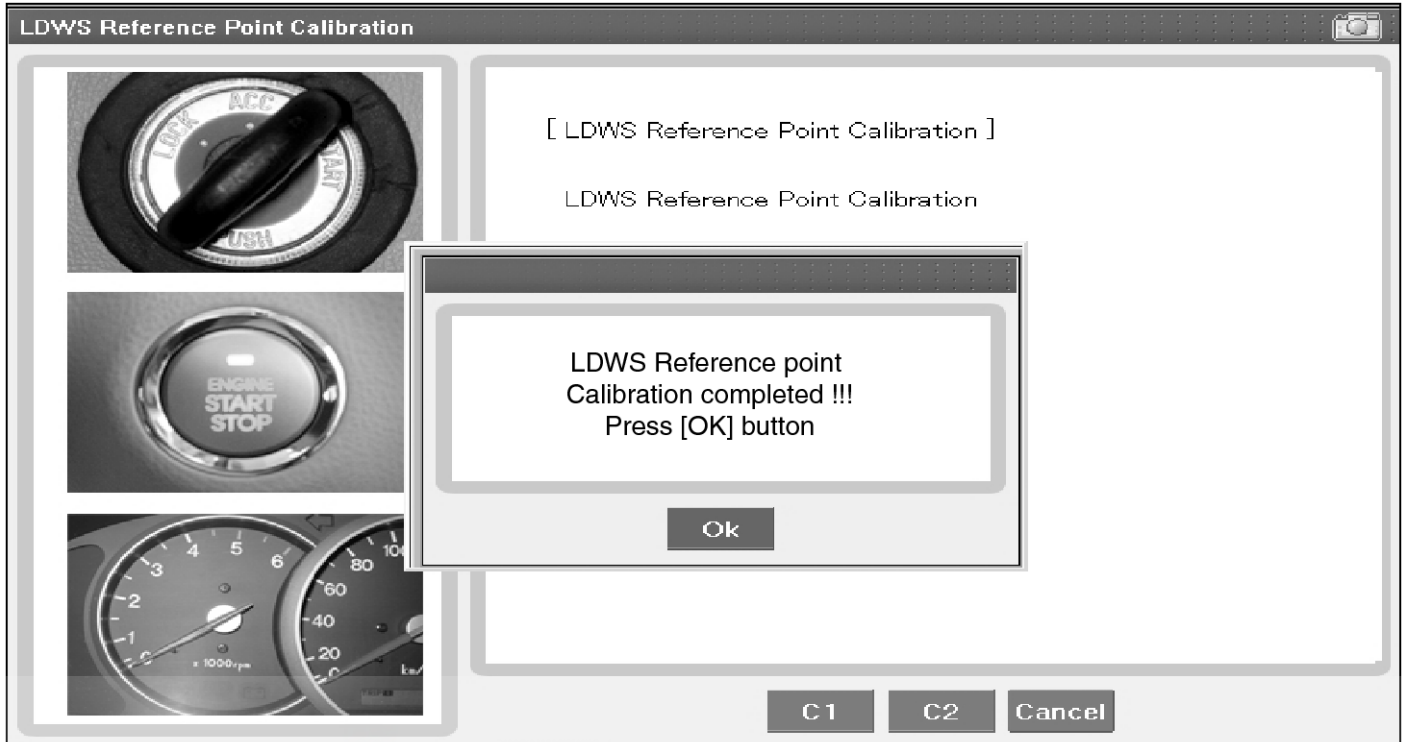
اولین سامانه دیجیتال تعمیرکاران

C1 C2 Cancel

SVIBE9268L

# BE-554

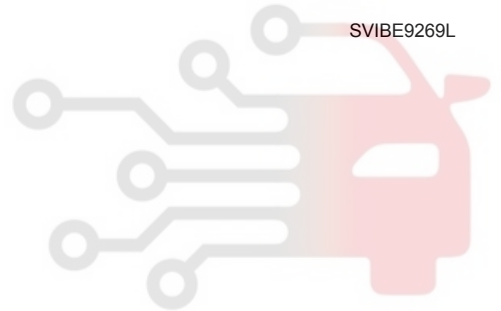
# Body Electrical System



# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

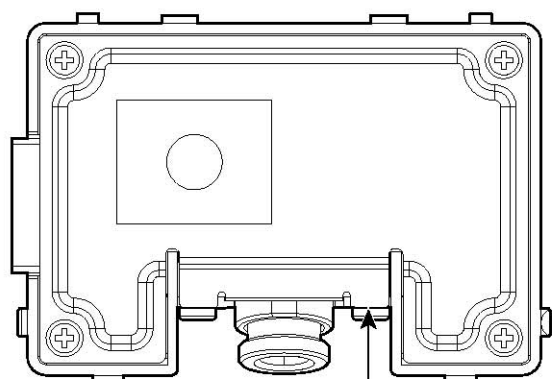


# Lane Departure Warning System (LDWS)

# BE-555

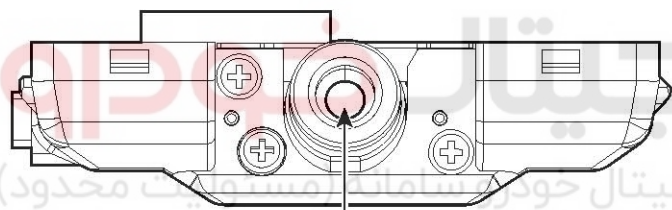
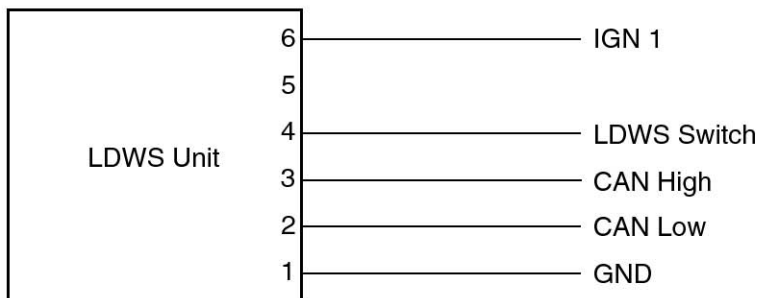
## Lane Departure Warning System (LDWS) Unit

### Components

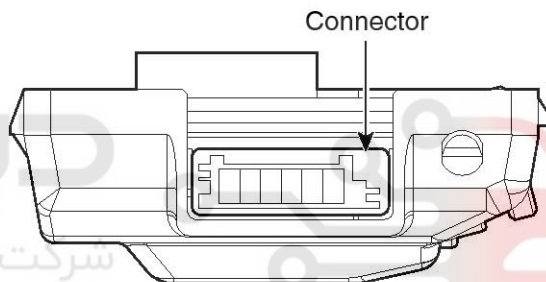


LDWS Unit

Circuit



Camera



Connector

سرتک دیجیتال خودرو سامانه تعمیرات محدود

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

| Connector |             |
|-----------|-------------|
|           |             |
| Plin No.  | Description |
| 1         | GND         |
| 2         | CAN Low     |
| 3         | CAN High    |
| 4         | LDWS Switch |
| 5         | -           |
| 6         | IGN1        |

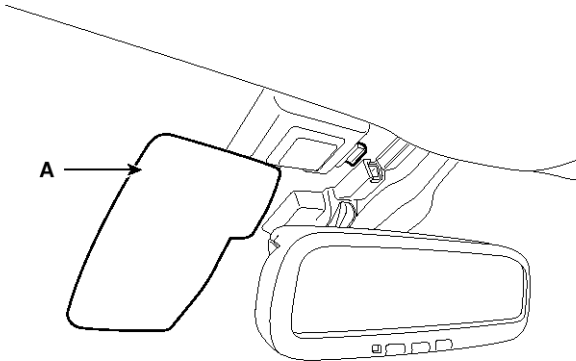
SVGBE0375L

## BE-556

## Body Electrical System

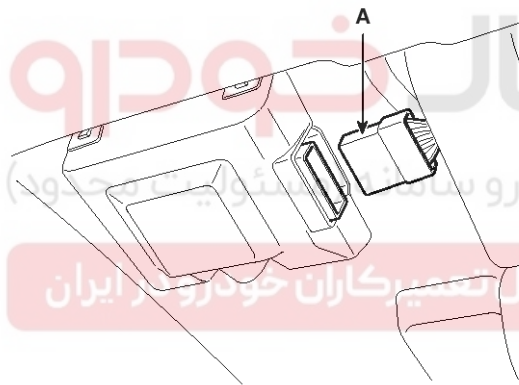
### Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the LDWS unit cover (A).



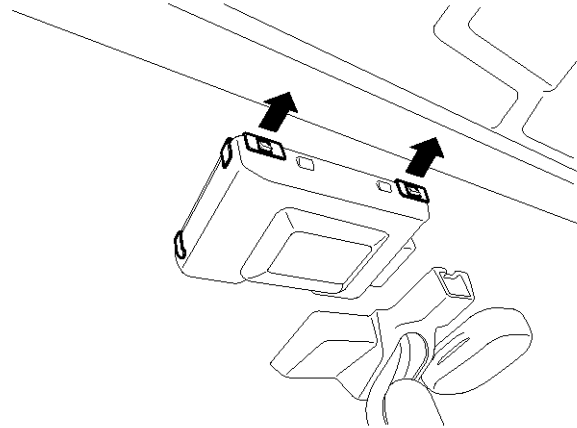
SVGBE0150D

3. Remove the LDWS unit connector (A).



SVGBE0151D

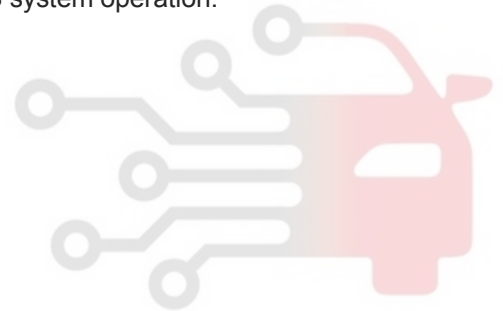
4. Remove the LDWS unit after widening the mounting clips.



SVGBE0152D

### Installation

1. Install the LDWS unit.
2. Install the LDWS unit cover.
3. Check LDWS system operation.

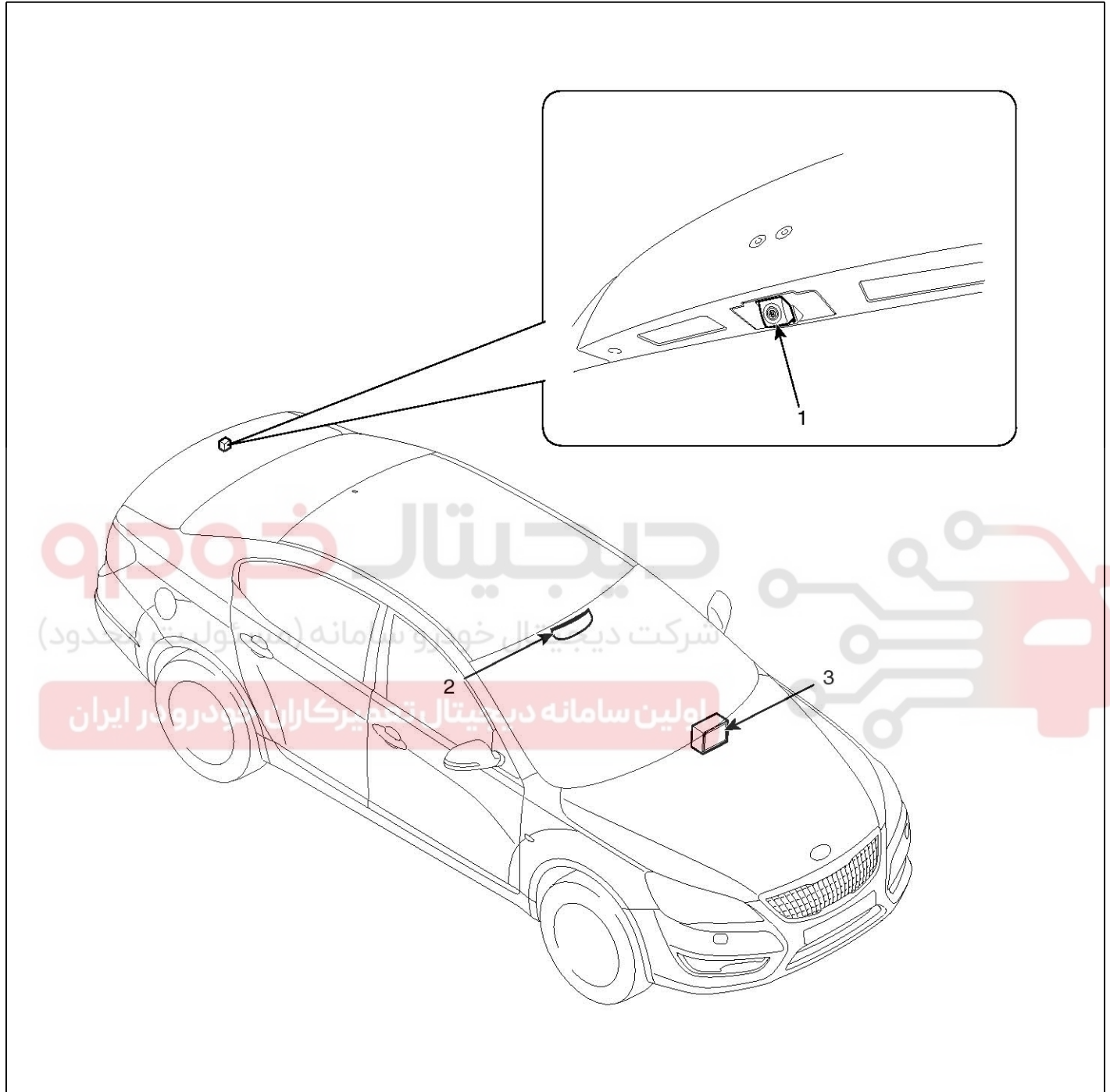


# Back View Camera System

BE-557

## Back View Camera System

### Component Location



SVGBE0377L

- 1. Back view camera
- 2. ECM mirror (Reverse display)

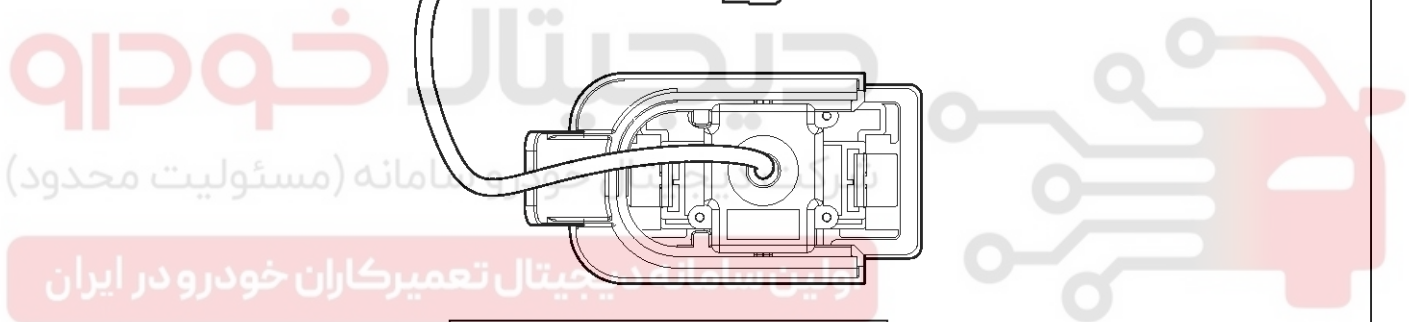
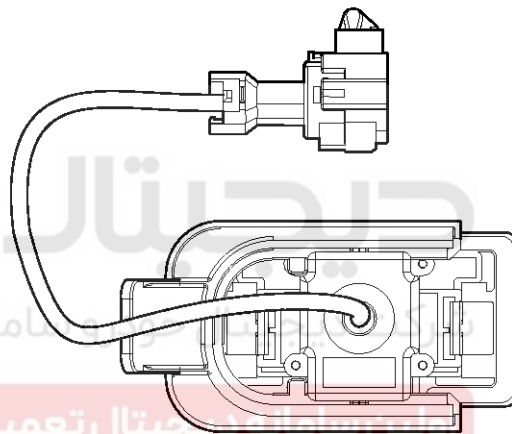
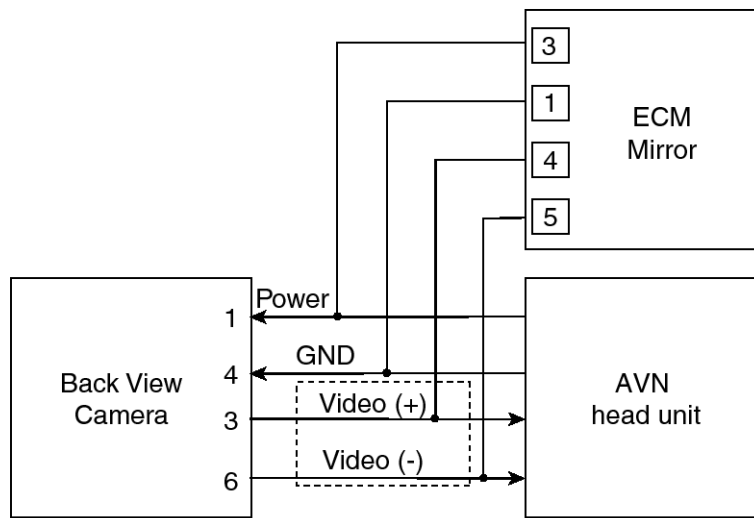
- 3. AVN head unit



# BE-558

# Body Electrical System

## Circuit Diagram



Back View Camera Connector

| Pin No. | Description |
|---------|-------------|
| 1       | Power       |
| 2       | Serial Line |
| 3       | Video (+)   |
| 4       | Ground      |
| 5       | -           |
| 6       | Video (-)   |

SVGBE0380L

# Back View Camera System

## BE-559

### Description

Back view camera will activate when the backup light is ON with the ignition switch ON and the shift lever in the R position.

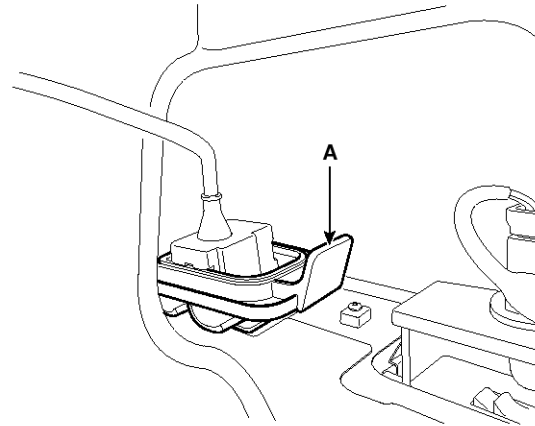
This system is a supplemental system that shows behind the vehicle through the ECM (Reverse Display Room Mirror) mirror or AVN head unit while backing-up.

### ⚠WARNING

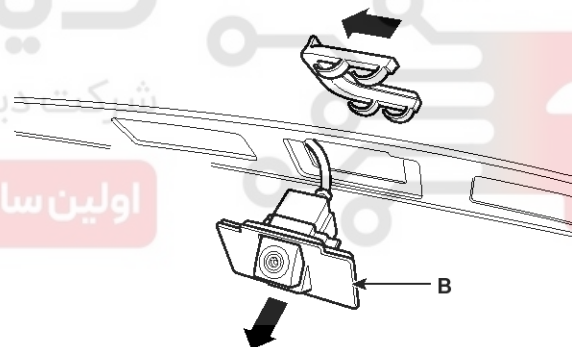
This system is a supplementary function only. It is the responsibility of the driver or always check the inside/ outside rearview mirror and the area behind the vehicle before and while backing up because there is a dead zone that can't see through the camera.

### Removal

1. Remove the trunk trim in the trunk after removing the screws and clips.  
(Refer to the BD group - "Trunk")
2. Remove the camera holder (A) as shown arrow direction, and then remove the back view camera (B).



SVGBE0163D



SVGBE0164D

### Installation

1. Install the back view camera and camera holder.
2. Install the trunk trim.

دیجیتال خودرو  
 شرکت دیجیتال خودرو سامانه (مسئولیت محدود)  
 اولین سامانه دیجیتال تعمیرکاران خودرو در ایران